RAILROAD GAZETTE

FRIDAY, APRIL 17.

CONTENTS.

	PAGE.
ILLUSTRATIONS:	
High Trestle—Minneapolis & St. Louis Ry.	260
Direct Steam Regulating System	261
Robert's Metallic Pipe Coupling	263
Laboratory of Lehigh Valley R. R.	264
Wright's Steam Economizer for Compound Locomotives.	266
Sumpter's Car Journal Oiler.	267
CONTRIBUTIONS:	
Air Pumps—A Correction	259
Engineers in Brazil	259
Coupler Unlocking Devices	259
"31" and "19" Train Orders.	259
Pile and Trestle Bridges on the Minneapolis & St. Louis Ry.	260
EDITORIALS:	
The Boycott on the Chicago & Alton	268
Surveys for the Inter-Continental Railroad	269
Some Consideration of Electric Motors for Railroad use.	269
The Traffic of the Salt Ste. Marie and the Suez Canals.	270
EDITORIAL NOTES	268–270
New Publications	271
GENERAL NEWS:	
Locomotive Building	273
Car Building	273
Bridge Building	273
Meetings and Announcements	274
Personal	275
Elections and Appointments	275
Railroad Construction	276
General Railroad News	278
Traffic	278
MISCELLANEOUS:	
Technical	271
Railroad Law	274
The Scrap Heap	272
Shop Notes from St. Paul.	259
The Chicago "Alley" Elevated Railroad	259
Air Brakes in Freight Service	261
Train Heating	262
An Automatic Track Recorder	263
Wrecking Outfit and Handling Wrecks	265
An Indian Route Table	266
The Staying of Locomotive Fireboxes	266
Pennsylvania Relief Department	271
Abstract of Patents on the Compound Locomotive	271

Contributions.

Air Pumps—A Correction.

The New York Air Brake Company,
NEW YORK, April 7, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of April 3 the article on "Air Pumps for Heavy Suburban and Freight Engines" has some errors in the second paragraph which we desire to correct. The 7-in. pump described is exactly twice the capacity of the 5-in. pump, and uses the same amount of steam per cubic foot of air. Compared with the Westinghouse 8-in. pump when run at its full capacity, the 7-in. duplex pump will deliver 67 per cent. more air with the same amount of steam used by the 8-in pump, or it will deliver double the amount of air with but 20 per cent. more steam than the 8-in pump. Its actual capacity is to charge a 50 car train from 0 to 70 lbs. in six minutes.

A. P. MASSEY, Mechanical Engineer.

Engineers in Brazil.

RIO DE JANEIRO, March 9, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of Jan. 16 you print a letter from the Brazilian Minister in Washington saying there is a great demand for engineers and surveyors of experience in the new enterprises of Brazil. I sincerely hope few have or will come, for there is no such demand. When a few of the paper schemes do at last mature, Brazilian engineers are always employed. Such as they are, there are plenty to choose from, and foreign engineers cannot hope for employment, except in foreign enterprises. Numbers of experienced engineers have been looking for employment—men of many years experience in the Plate who are more or less acclimated. The Brazilian Government is merely practicing another shameful deception.

TRUTH.

Coupler Unlocking Devices.

NEW YORK, April 6, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There seems to be some talk of the adoption of a standard appliance for operating automatic couplers from the side of the car. Most of the couplers of the M. C. B. type require the lock to be lifted from above by a rod and crank connected with the lock by a chain. I desire to call attention to the well-known fact that none of the couplers so operated are truly automatic, in that the operating rod serves merely to unlock the knuckle and does not set it open for coupling; nor is it possible to so change these couplers, that by the use of such rod and chain the knuckle may be thrown open, but in order to do so, the trainmen must, with all of them, go in between the ends of cars and open the knuckle by hand.

In restricting the operating rods to the form referred to, couplers of the M. C B. type would be confined to those of the character above described, none of which fulfill the demands of safety or comply with the requirements of the law of this state. The bill introduced in the last Congress has the same provision as the New York law for coupling and uncoupling entirely from the sides of the cars. It is thus seen that none of the couplers now in use, operated by that device, conform to the requirements of the law of this state, and that therefore all railroad companies using such devices, are not relieving themselves from any responsibility, on account of accidents to trainmen, which they would not incur by the use of the common link-and pin coupler.

Furthermore, leaving out all question of throwing open the knuckle, and thus fulfilling the requirements of the law, the rod and chain, as generally attached to the end of the car, is an inefficient and imperfect device. Every railroad man knows that it requires constant repair, and every one has seen such devices inoperative in winter on account of being frozen solidly to the car.

The adoption of such a device as standard, itself insufficient, as above described, would further restrict railroad companies in their choice of M. C. B. couplers, none of which fulfill the requirements of the law.

M. C. B.

"31" and "19" Train Orders.

RADFORD, Va., April 2, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Will you please state (1) whether a "19" order can be used to annul a "31" order; also (2) state whether it is not perfectly proper to to use a "19" order to advance a train against a train of superior right or (3) to annul a a schedule. The "19" is of course to be used only in cases where a failure to deliver the order would result in delay only and not cause a collision. Read rule 512 and assume that the standard rules are being used.

DISPATCHER.

[The question as to whether a "31" or "19" may be used in a given case is one of opinion rather than propriety. The "19" order is used by some under all circumstances. In the above inquiries "Dispatcher" appears to be of the opinion that it is not as safe as the other, and his questions, with that idea in mind, are evidently as to the relative safety of the two forms in the cases stated. Assuming, then, that in the use of a "19" order a safeguard is omitted, it would not be as well for amending a "31" order, because the amending of such an order should be accompanied by all the safeguards under which it is given. To do less would be sacrificing a very important principle. Suppose, for instance, that the omission to take signatures to the amending order, from either train, should result in the train not getting it, the order would not then be annulled so far as that train was concerned. As to whether the "19" order may be properly used to advance a train against a superior, if this were done with a duplicate order, the "31" would be used for one train and the "19" for the other, which would be mixing things a little. Again, if the signatures are not taken from the inferior train, there is the chance of hurried reading and misunderstanding.

For annulling a schedule there would not seem to be any objection to the "19" order. These replies are made to "Dispatcher," keeping in view *his* idea of the relative value of the two orders with respect to safety. All experience is not agreed on this point, and it is therefore still an open question. Every one admits the desirableness of getting signatures, but yet meeting points are made for fast passenger trains on form 19, and have been so made for several years; and this on conservative roads —EDITOR RAILROAD GAZETTE.]

Shop Notes from St. Paul.

The shops of the Great Northern Railway are situated in the northern part of St. Paul on the line to Minneapolis. The buildings consist of a large roundhouse, about 60 stalls, boiler and smith shop, erecting shop, with the offices at the north end, freight and woodworking shop, coach and paint shop and storehouse. Stone has been used in all structures about the plant, and gives it a very substantial, solid appearance. The general tendency is shown in many ways in connection with this line; from the residence on Summit avenue and their general office building down to the track everything looks heavy, as if planned for the future rather than simply for to-day.

The work at this end of the line is confined mostly to engine and coach repairs, nearly all the freight work being down at St. Cloud, some distance north, where, on account of its being a convenient freight centre, the company has recently erected a conveniently arranged and well-appointed plant for taking care of this part of the equipment. The management seems to be thoroughly imbued with a progressive spirit, and intends to be able to handle all the freight it can lay claim to. This is seen from the additions now being made in this branch of the service. There have been just delivered 250 4,000 lb. box cars, and now an order of 200 60,000-lb. furniture cars is partially filled, besides 600 6,000-lb. box cars yet to come, all from Haskell & Barker, of Michigan City, Ind. A corresponding proportionate increase in the motive power would now be quite in keeping. Future engines will be made according to standard designs, in order to remove the diversity of designs. There are now 36 different types in use. One advantage of this, however, is that it gives the department an excellent opportunity to make comparisons of the various devices of the different makers. They all agree in one particular at least, which is the non-use of hollow stays, and many of the engines are devoid of anything in the shape of a driver brake.

One of the steam shovel cars originally built by a well-known eastern manufacturer is being rebuilt. All the machinery is fastened to a very heavy, upper framework, the new design being much stronger and consequently better for the service than the old. For this class of work it has been found by practice that anything light is in the end rather expensive and that it is better to have a surplus of strength than to fail by racking the joints and overstraining all the parts on account of the desire to save a little in first cost. The superstructure of the remodelled shovel rests on the floor planking of the flat car and is securely bolted down through the sills. The two duplex engines are supplied with steam from a 4-ft. 6 in. × 8-ft. upright boiler standing at one end. Both winches are controlled by Prony brakes, and all reverse levers, brake traddles and clutch levers are brought together at the shovel end by means of bell cranks, so that complete control of the excavating is in the hands of one man.

During the past winter a number of men here have attended a course of lectures on electricity at one of the institutes, and are following up a small beginning vigorously. So much so that any books having a possible bearing on this subject are in great demand at the public library.

The Chicago "Alley" Elevated Road.

The only elevated road in Chicago that is progressing and gives evidence of completion at an early date is the one being built by the Chicago & South Side Rapid Transit Co. from Van Buren street south. It is known as the "Alley," elevated road because it mainly traverses an alley between Wabash avenue and State street. The original intention was to proceed down one side of the alley on a right of way purchased by the company. It was found necessary, however, to cross the alley in several places in order to avoid large blocks of buildings. Now the road is completed from Twelfth street to Thirty-ninth street, with a short break at Twenty-second street. It was found to be next to impossible to obtain a right of way on either side of the alley from Twelfth street to Van Buren street, and permission was asked of the Chicago City Council to proceed in the alley on city property from Twelfth to Congress street. An ordinance was passed to this effect on the night of April 2, but there were rumors that it would be vetoed by the mayor; but the power of the mayor to veto expired by limitation on the 9th, hence on the 10th this ordinance became established. It is a valuable franchise, and gives this road a right of way in thickly settled portions of the south part of the city.

The road was organized under the general laws of Illinois, and hence escapes many of the annoyances to which city railroads are subjected. Up to the present time over $2,000,000 has been expended in obtaining right of way along the alley. In most cases it has been purchased, leaving the owner to pass out to the alley under the structure and giving him other rights, which do not in any way interfere with the operation of the road or the maintenance of the structure.

The design of the structure was given in the *Railroad Gazette*, April 4, 1890. It consists of four lines of plate girders, one under each rail, carried on two columns placed 12 ft. centres. The design of the stations was given in the *Railroad Gazette*, April 11, 1890. It will be remembered that they are under the structure, on the street level, and have many points of advantage over the stations on the New York roads. An improved plan of distributing and collecting tickets will be adopted.

The motive power will be steam locomotives of the latest design, some of which will be compound. They will be heavier than the New York engines, and have about 50 per cent. greater heating surface. They will be adapted to burn either anthracite coal or coke, and possibly anthracite culm. The car equipment will be the best that can be purchased for the purpose, and will be carried on steel-tired wheels, and all modern safety appliances will be used to prevent accidents to trains and passengers.

The new ordinance, passed April 2, is an amendment of the one granted March 26, 1888, which gave permission to the Chicago & South Side Rapid Transit Railroad Company to operate for 50 years an elevated road in the city of Chicago. The amendment authorizes the extension of the road upon the following routes: Commencing between Thirty-seventh and Thirty-ninth streets and proceeding southwardly between Wabash avenue and State street, through and over such lands as may be required by lease, purchase, condemnation or otherwise, to a point to be selected between Fortieth and Forty-third streets, thence eastwardly to a point between Grand Boulevard and Michigan Boulevard, thence southwardly to a point between Sixtieth and Sixty-seventh streets, thence eastwardly to the westerly line of Jackson Park. Also commencing at a point to be selected between Fifty-fifth and Fifty-ninth streets, proceeding westwardly to a point between Wentworth avenue and Wallace street, thence southwardly to Sixty-third street. Also from a point to be selected on the above line between Cottage Grove avenue and South Park avenue southwardly to Seventy-first street. The conditions and restrictions are that no point of the structure shall be less than 14 ft. above the established grades of the streets; the land condemned shall not exceed a width sufficient for the operation of more than three parallel tracks when laid 12 ft. from centre to centre, with whatever additional width is necessary to give proper clearance for passing trains from buildings, except that the company may acquire additional width where necessary for the convenient handling of its trains

for junctions and termini, and further except where additional space is necessary for switches, curves and turnouts.

The most valuable part of this ordinance is Section 4, which grants the company, in accordance with a petition of the owners of lots and lands constituting the majority of the frontage upon that portion of the alley between Congress and State streets, a right to operate this road through the alley, with the restriction that not more than two tracks shall be operated along the alley, and that no portion of the structure above the surface of the alley, except the supporting columns and the transverse girders, shall be nearer than 4 ft. to the exterior lines of the alley.

The time stipulations are that at least two tracks shall be constructed within three years from the date of the ordinance. However, any time lost in legal proceedings is to be added to this period of three years, unless in the opinion of the City Law Department the suits brought were for the purpose of procuring a delay.

The compensation demanded is $4,000 per annum for the right of way on the alley between Congress and Twelfth streets, and the city reserves the right to use the structure or tracks for placing thereunder its police, fire alarm and telephone wires. A bond of $100,000 to save the city harmless from damages is required, and this was given by Calvin Goddard, President of the road.

Mr. Goddard deserves much credit for the management of the affairs of this road. In spite of considerable opposition, the structure as far as Thirty-ninth street is nearly completed, and will be in operation by Sept. 1. Every part of the structure is the best of its kind. A 90-lb. rail, with the Clark-Fisher joint, is used, and the stations already constructed are an ornament to the localities where they are placed.

Pile and Trestle Bridges on the Minneapolis & St. Louis Railway.

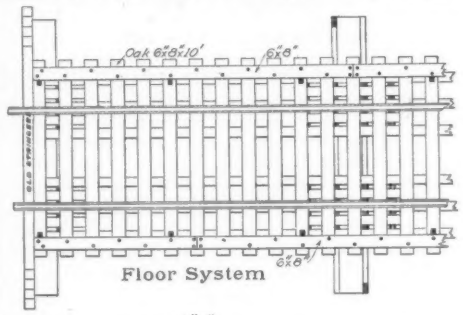
Minneapolis & St. Louis Railway,
MINNEAPOLIS, Minn., March 25, 1891.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Being a bridge builder of some 22 years' active experience, I am much interested in the published drawings and descriptions of pile and trestle bridges which appear in your columns from time to time. If you are not surfeited with this branch of railroad maintenance, I beg to submit for publication a description of the standard pile bridges in use on this line together with that of two high trestles which we have recently rebuilt. I do not claim to be the inventor of this method of construction for pile bridges, but I do claim for it several advantages, the principal of which are economy in maintenance, the superior distribution of loads on the stringers, a comparative freedom from accident by fire and an almost perfect ventilation. These advantages, though individually small, are, I think, in the aggregate, of an importance which should not be overlooked by careful bridge builders and railroad managers.

We use white oak piles of a size not less than 11 in. diameter, clear of the bark, in the middle of the pile; and insist on all the bark being removed from piles before they are driven. The removal of the bark not only improves the piles in appearance, but adds at least 25 per cent. to their lives.

Our standard cap for pile bents is of white pine 12 in. × 14 in. × 14 ft. laid flatwise on the piles. We lay it this way, because the broad surface covers the piles to a better advantage and also gives to the stringers more bearing surface. We never use tenons as a means to fasten cap and piles together, as our experience has taught us



STANDARD PILE BRIDGE.—MINNEAPOLIS & ST. LOUIS RAILWAY.

that they are not only costly, but the necessary mortises in the cap tend to weaken it and shorten its life. We use, instead of the tenon, drift bolts which are of a standard size, ⅞ in. round iron and 22 in. long, which, as will be seen, reach through the cap and penetrate the pile to the depth of 10 in. These drift bolts together with the sway brace fastenings at each end of the cap form what we think is the most economical and the very best construction for pile bents.

We space our bents 15 ft. 6 in. from centre to centre and use for stringers six pieces of best white pine 6 in. × 16 in. × 16 ft. in each span, three of which are packed together and placed as directly as possible under each track rail in the manner shown in the drawing. The packing blocks between the stringers are of the same width and depth as the stringers, and their length being 5 ft. 4 in., it will be seen that three of them can be made from one 16-ft. stringer stick. Some builders will no doubt criticise the judgment displayed in using such heavy timber for packing blocks. But if we were to cull our stringer timber so closely that every stick accepted would be without a flaw, and such as are necessary for stringers, we should be obliged to pay several dollars per thousand more for our timber than we now do, but by accepting a fair quality, and taking the poorest for packing blocks we not only get our timber at a lower price, but get a superior grade for the stringers proper.

It will be noticed that I have made the claim of a superior distribution of loads on the stringers, and if the reader will refer to the drawing, I think he will agree with me that no single member of the stringers can possibly take more load than its neighbor, and if his mind is unprejudiced he will also agree that no construction, where two sticks are placed under each rail and the others as jack stringers under the ends of the ties, has the advantage of so perfect a distribution of load.

We use no drift bolts to fasten the stringers to the caps, but leave them perfectly free to be raised at any time when the bents have settled, or when it is necessary to raise the track at either side of the bridge. The stringers are held in line on the caps by means of small cast-iron brackets, which are secured to the caps by lag screws, and are placed close against the sides of the stringers. The packing blocks are notched or gained down over the caps to the depth of 2 in., and as these are firmly bolted between the stringers it is plain that the stringers are locked in place on the caps in the very best manner without the aid of drift bolts. This advantage will be appreciated, not so much by the office man, who builds his bridges on paper, as by the poor fellow whose duty it is to keep bridges in repair, and to work for hours sometimes trying to remove a single drift-bolt so that he may be able to raise the stringer and fit a suitable block under it.

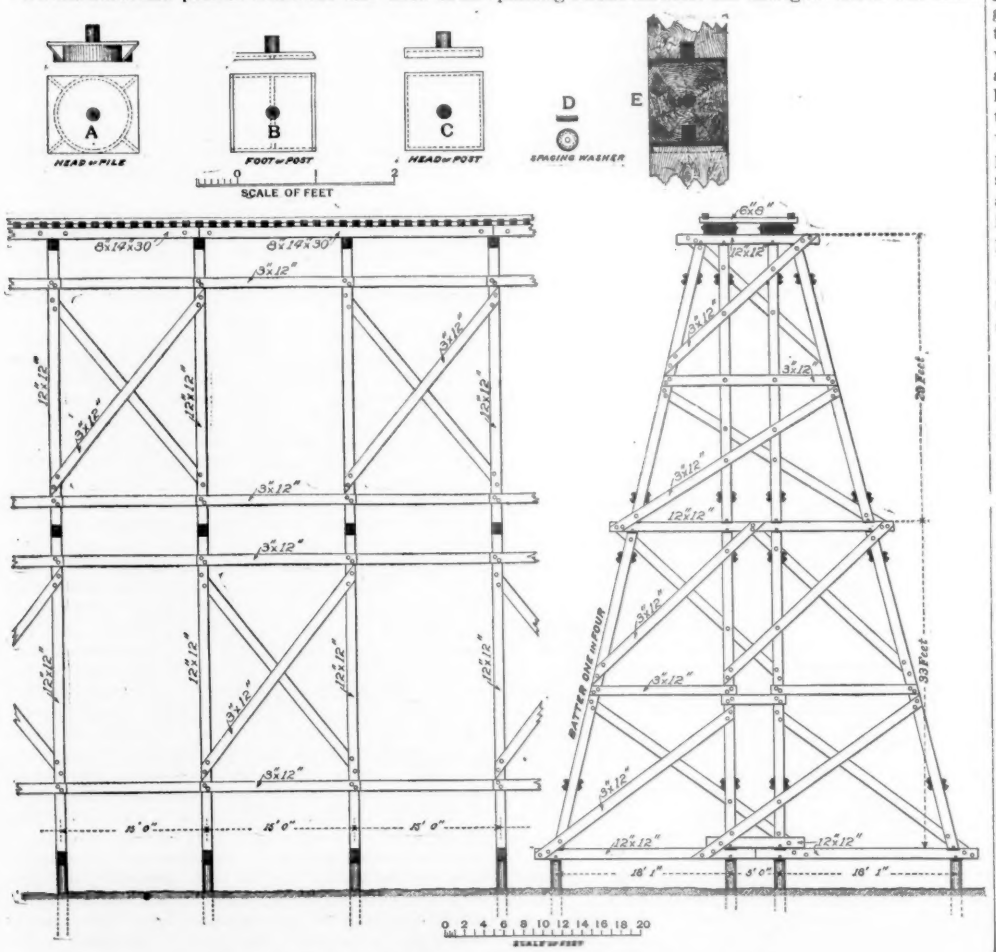
I next call attention to the ventilation of the stringers, or rather to the spaces between the stringer sticks, which serve both as ventilators, by which the timber is thoroughly aired and moisture quickly dried out, and as openings through which coals from a locomotive may fall to the ground without damage. To the latter claim the critic may say that he can see no advantage in this, because we have exactly the same timber surface exposed to the fire whether we pack the sticks close together or spread them apart. The statement is true, but the conditions are different. The strong current of air which follows in the wake of a moving train is a very active agent in displacing any live coals which may have found a lodgement, and if the spaces are many and the surfaces narrow it is plain that the sweeping current will have greater effect than if the opposite condition prevailed. The space between members of the same stringer is 10 in., and that between the stringer member and packing block is 2 in., which is formed by a light cast-iron spacing washer, through which the packing bolt is passed.

We use white oak ties, 6 in. × 8 in. × 10 ft., laid flatwise and spaced 8 in. apart. The ties are machine sized to 5⅞ in., which process we find to be cheaper than hand sizing and much better in appearance.

Our guard rail is of white pine, 6 in. × 8 in., laid flatwise on the ties and gained down over them 2 in., which leaves that portion above the ties only 4 in., or no higher than the rail. A low guard rail is necessary in our climate in order to clear the snowplows which would tear them off if they were higher than the track rail. We secure the guard rail to each tie with one boat spike, ½ in. × 8 in.

We keep the track in line on the bridge with two drift bolts ⅝ in. × 12 in. in every fifth tie. Holes are bored through the ties where the drift bolts are to be located which are large enough to allow the drift bolt to go through easily, and they are then driven into the stringer until less than 1 in. of the head is above the tie, and left that way so as to afford a hold for a claw bar when it is necessary to draw the bolts and line the track. The advantage in this plan of tops for pile bridges will be apparent at once to the practical repairer, for, instead of sending out two good men from his small force to flag trains while he removes the track spikes and disturbs the gauge of the rails, in order to straighten the line of track on his bridge, he simply draws a few of the drift bolts, throws the whole track either way, as he wants it, replaces the drift bolts and is ready to go, in less time than it will take the flagmen to walk to their stations. To the critic who objects to this plan of construction for pile bridges I will say, try it as I have done for 12 or 14 years, and then admit your practical experience as an argument against your theory.

Nearly all bridge builders know how to build a good,



HIGH TRESTLES.—MINNEAPOLIS & ST. LOUIS RAILWAY.

strong trestle, and can carry it to almost any height and yet have it perfectly safe for the passage of heavy trains at a proper speed; but I am inclined to the opinion that many of them, in their zeal for abundant strength, lose sight of the fact that good bridge timber is becoming scarce and high priced, and that they should construct their bridges in such a manner as will lengthen their lives and at the same time cheapen the cost for repairs. An ordinary wooden bridge deteriorates at the rate of about 11 per cent. annually, and in view of this rapid decay it is the duty of engineers and builders to exert themselves to some extent to arrest this waste and reduce if possible the heavy draft on the treasuries of their companies for bridge maintenance.

We have recently rebuilt on the plan herewith two high trestle bridges, the aggregate length of which is 931 ft., and the maximum height about 80 ft. These bridges have some features in their construction which I have never seen employed before, and, as they may be of considerable value to the progressive reader, I will endeavor to describe them.

It is well known to all men who are charged with the inspection of wooden trestle bridges that the timbers in them will begin to rot first, and continue with the greatest rapidity, at the points where they come in contact with each other. It is equally well known that, in contact with cast iron, timber will last longer than if there were no contact at all. In view of these facts I have endeavored to build these bridges so that there can be no water pockets or places where water can remain, and have contrived suitable bearings of cast iron for every joint in the bridge which occurs below the top of the track stringers.

Detail *A* shows the casting used to cover the head of the piles. *B* is a saddle under the foot of the post. *C* covers the head of the post. *D* is the spacing washer which keeps the brace plank from contact with the posts, and *E* shows *B* and *C* in position. In addition to this the caps are covered with heavy sheet iron under the track stringers.

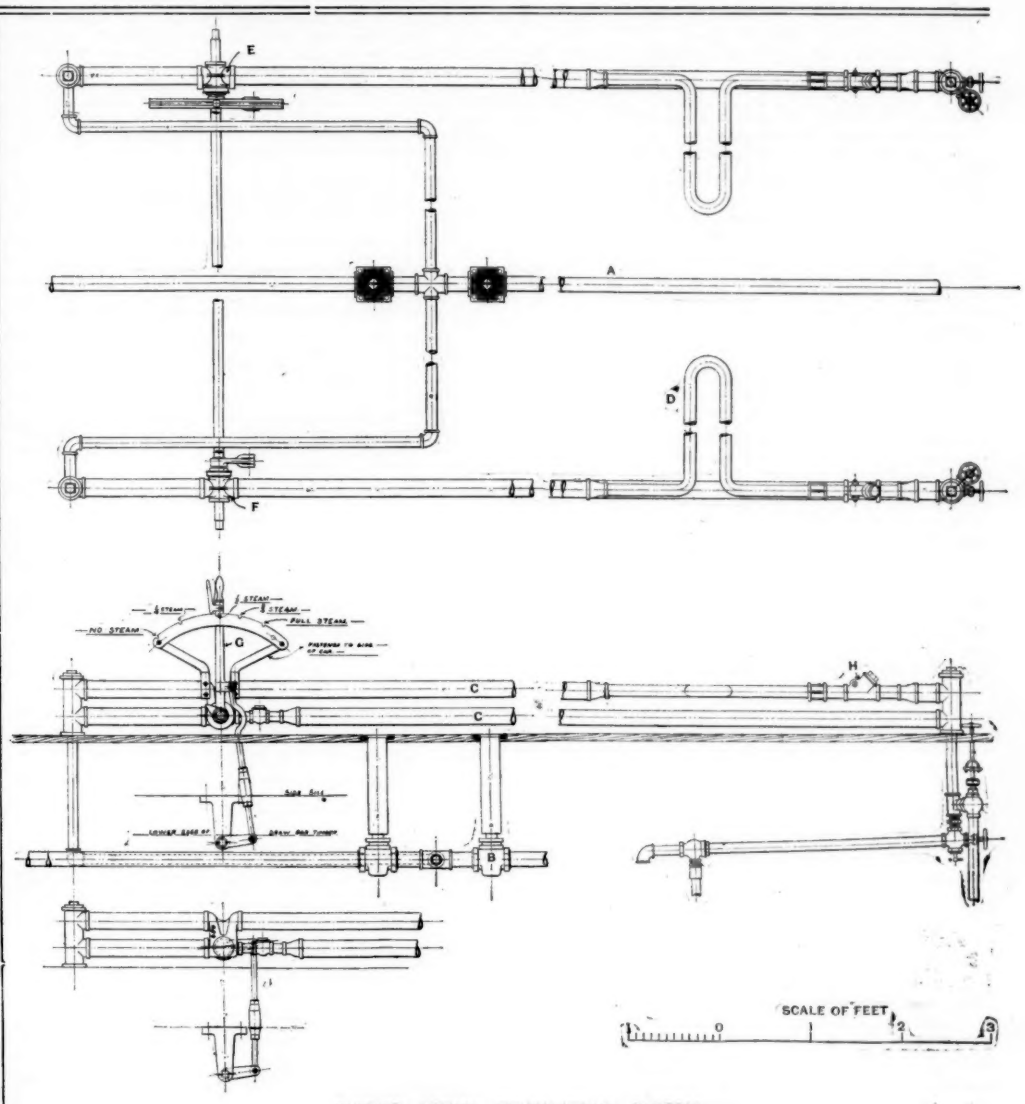
These bridges are very rigid and strong, and I can see no reason why they should not last 14 years instead of nine, as is usually the case.

W. B. HIXON,
Superintendent Bridges and Buildings.

A Regulating System for Direct Steam Heating.

The proper distribution and regulation of direct steam heat within a car is desirable, but has heretofore not been accomplished by any simple means. The temperature of a car cannot be regulated by varying the steam pressure as the limit of pressure, say 40 lbs. per square inch, does not give a sufficient variation in temperature to meet all requirements, nor does the admission of a small amount of steam into the pipes serve satisfactorily, for its condensation is local and the radiation of heat not distributed. But a system in which steam pipes extend along the side of the car, so arranged that some or all of them can be entirely shut off from steam, permits of regulation, and while reducing the amount of radiating surface still evenly distributes the desired heat throughout the length of the car.

Figures 1 and 2 represent such a system as used by the Safety Car Heating & Lighting Company, the first being a plan of the piping of a car, and the second being an elevation of the same. *A* represents the train pipe with its usual shut-off cocks *B*. Within the car and along each side are two pipes *C*, one on each side being provided with an expansion pipe *D*. The pipes on each side are connected at their ends by the branch tees. As near as possible to the end are placed the cock *E* on one side and *F* on the other. To the cock *E* is connected the handle *G*. This handle has a small projection on its side to which is connected a link conveying the motion imparted to the handle to the rock shaft, and thence to the cock on the other side of the car. The handle works around a quadrant in which are five notches. When placed in the first one marked "no steam," then there is no steam admitted into any of the pipes. When placed at the one marked "¼ steam," the lower pipe on the side of the car to which this handle is attached is supplied with steam and acts as radiating surface. When placed in notch marked "½ steam," the steam is admitted into the lower pipes on each side of the car and is prevented from passing into the upper pipes at the other ends by the check valves *H*. When placed in the notch "¾ steam," steam is admitted into two pipes on one side of the car and the lower one on the other. When at "full steam" all pipes are supplied with steam and act as radiators. The condensation is discharged by expansion traps connected with the farther end of the radiating pipes.



DIRECT STEAM REGULATING SYSTEM.

SAFETY CAR HEATING AND LIGHTING COMPANY.

Air Brakes in Freight Service.

NEW ENGLAND CLUB.

At the April meeting of New England Railroad Club the above subject was considered. Mr. Angus Sinclair opened the subject with a paper on "Inspection of Air Brakes of Freight Cars," read by the Secretary. Extracts follow:

It is the question of a few years only when a freight car without a power brake will be as great a rarity as it is to-day to see a passenger car controlled by the hand brake It is well to look facts in the face. As the general application of air-brakes to all kinds of cars is inevitable, it becomes the duty of the officers in charge of railroad rolling stock to lose no time in beginning to prepare for the change. The preliminary movement ought to be to make public recognition of the air-brake in the rules of interchange, and to establish regulation about its condition. A good many of the railroad companies operating freight cars equipped with air-brakes have provided appliances and men for testing the brakes and maintaining them in good order, but others have practically ignored the brake. The curious feature of the case is that the company taking good care of the brakes generally appears to perform the work of inspection at smaller cost than the company that neglects the work. Neglect of air-brakes comes to a great extent from lack of system.

Within the last month I have been in communication with nearly all the heads of the car departments of railroads running more than one thousand freight cars, and the admission generally made upon the air-brake question is that something must be done in the near future to inspect air-brakes at all interchange points. Some of the writers anticipate no difficulty in doing the work, others appear to think it one of the most stupendous problems that ever railroad officers have had to work out. Those who are appalled by the magnitude of the work to be done may receive comfort from reading how others have done it.

Mr. J. H. Small, Superintendent of Motive Power of the Southern Pacific, writes: "We are one of the few systems the entire rolling stock of which is equipped with air-brakes; and having mountain grades on all three of our main lines, we are naturally obliged to give the care of air-brakes especial attention. At all division terminals we have air plants for testing air-brakes on freight and passenger cars; these, however, are intended more for the use of car repairers, and usually located at the repair shops, and when repairs to cars are completed, air is applied at standard pressure, and cars are turned out from the repair tracks with air-brakes in first class condition. I think it is important that air plants of this kind should be located at all important interchange points, as well as other stations where car repair shops are situated. Our switch-engines are all equipped with air-brakes; and, at interchange points, before cars are received from the connecting line, the inspectors have air applied to them by the switch-engine, and they are thus enabled to determine at once, and before the car is received, whether there are any defects in the air-brakes. Therefore, where switch-engines are equipped with air-brakes, it would seem to be unnecessary to have an air plant as above described at interchange points where there are no car repair shops and simply ordinary running repairs are made. I inclose a copy of our book rules governing use and care of air-brakes; also inclose a card on which conductors are required to report any defects they observe in the air-brakes during their run. This card is handed to the inspector immediately upon arrival at terminal station. This is intended to enable the car inspector to give immediate attention to such cars as are reported on this card and save the time that would be otherwise lost in hunting for or perhaps overlooking them. I an not prepared just now to offer any suggestion as regards interchange rules for inspection of air-brakes, but think that one rule would, perhaps, be sufficient—that is, air-brakes would not be received except in first-class order."

The book of rules referred to contains instructions about the handling and care of the air-brake, which all men concerned in the care or management of the brake ought to be familiar with. The card mentioned is for the conductors reporting defects of the brakes on cars that may be on his train. The letter, book and card indicate that the air brakes on cars belonging to the Southern Pacific are systematically cared for. It contrasts strikingly with the hap-hazard methods in vogue elsewhere, which lead to general neglect.

There is a mistaken impression in some quarters about the class of workmen necessary to keep the brakes in order. An ordinary car inspector will be told to put in order a defective brake, and, because he fails, the conclusion is jumped at that the services of a machinist are necessary to do the work. It is not skill but knowledge that the inspector or car repairer lacks. If he were drilled for a day or two in taking the mechanism of a brake apart and putting it together again he could do the work just as well as a machinist. The work cannot be learned by inspiration, and it is the duty of the officers in charge to see that the men under them receive the opportunity how to put the brakes in order.

Judging from the numerous letters which I have received on the subject of "Air Brakes on Freight Cars" from the men best able to speak with authority, I conclude that the pressing requirements are:

1. The recoginition in the rules of interchange of cars, that air-brakes are an essential part of a car, and that they must be delivered in working order.

2. That it is the duty of railroad companies to provide the means of testing and repairing the air-brakes on all freight cars that pass over their lines.

Mr. MARDEN: This subject seems to me one of almost vital importance to the railroad companies. . . . At such points as Rotterdam Junction, where freight trains are delivered to our roads from the West Shore road, and they are supposed to be immediately made up and forwarded to their destination, it would be impossible for us to maintain a plant to test all the cars separately or in separate trains; but if the air-brakes have been properly maintained by the roads owning them, and by the different roads over which they pass, we shall have very little trouble. The air-brake is so made that it is not liable to get out of order on a run of almost any number of miles, if it is in proper condition when the car starts. At the present stage of the application of air-brakes to freight cars, it seems to me that their careful maintenance and inspection is of more importance than when all our cars shall be equipped with air-brakes, for then all the roads will consider that a part of the equipment, and see that they are properly maintained. Air-brakes on freight cars to-day are not given the care they should have, even on the roads that own the cars. About 600 of our cars are so equipped. At our Fitchburg shops we have a plant for testing air-brakes, and in Boston we have such a plant, though that is more praticularly for passenger equipment.

Mr. LAUDER: I believe Mr. Sinclair has struck the key-note when he advocates the establishment at junction points or inspection points of an air plant whereby the brakes on the cars can be thoroughly tested. . . . I think the establishment of these air plants is something that cannot be avoided, with the increase of the use of air-brakes, in order to maintain them in a proper condition and them make available for their purpose.

Mr. MARDEN: I think the proper maintenance of the air-brake is of vastly more importance than the inspection at certain points. If we had a plant at Rotterdam

Junction, for instance, it might help us to a certain degree, but we should hardly want to cut a car from the train and delay it 24 or 48 hours because the air brake was inoperative, provided the hand brake was all right. I think the Westinghouse freight train brake is so constructed that if it is given a fairly good maintenance, we will find it in effective condition 999 times out of a thousand, on inspection.

Mr. ADAMS: I agree with Mr. Lauder that the air-brake has come to stay, and the time is rapidly coming when all the roads will use air-brakes. It is a big question, and means large expense, and it needs consideration. ..... To put vertical hook couplers on to the cars of the Boston & Albany Railroad will crowd $200,000 pretty closely, and we have but few cars compared to some other roads, and a road that has 40,000 cars would have to spend a vast amount of money for this purpose, and it costs about double to put on air-brakes that it does to put on the vertical hooks. But there is a necessity for it, and it is going to be done. The idea generally prevails that to inspect the air-brakes on the track, the cars would have to be switched; but with the arrangement which Mr. Lauder suggested, of having pipes laid through the yard, the air-brake could be tested in the train as it stood without removing the car, and when the train is next made up any car with a defective air-brake could be removed. If the switching engine were used to test the air-brakes, that would involve the necessity of cutting the car out. I think there will have to be some kind of an automatic arrangement for taking up the slack of brakes. There are some devices which have been patented for that purpose, but not yet brought into use to any extent that I know of. We know that brake-shoes wear pretty fast on heavy grade roads, so that the connections should be watched very carefully at all points when the train is inspected.

Mr. MARDEN: I think some means should be adopted for instructing the train men thoroughly in the construction and use of the air-brake. I think an instruction car that could be subject to the action of the different roads would be a good thing.

Mr. LAUDER: I think before many years all the roads will own a separate air-brake instruction car. The Westinghouse company, I am informed, will meet the roads half way and furnish a good many appliances for such cars free of charge, in order to have them properly equipped, so that the employees of the different roads may be properly instructed with regard to the operation of air-brakes. I would like to ask Mr. Adams how far his road has gone in the matter of changing the passenger brake to a quick-acting brake.

Mr. ADAMS: Probably seven-eighths of them have been changed.

Mr. LAUDER: Then practically the Boston & Albany Railroad in its passenger equipment has adopted the quick-acting brake. We are making that change as fast as possible on our road.

Mr. ADAMS: If each road cannot have an instruction car, I think it would be a good plan for the different roads running out of Boston to combine for the purchase and equipment of such a car, to be used for short periods by each of the roads from the proper instruction of its train men in the use of the air-brake, say two or three weeks at a time.

Mr. MARDEN: That matter has been discussed by the officials of our road, and thought favorably of, and I have no doubt the Fitchburg road would bear its share of the expense of such a car.

Mr. ADAMS: I move that the New England Railroad Club recommend to the railroads centering in Boston that they purchase or build a car and equip it properly for the instruction of the train men in the use and operation of air-brakes, said car to be in charge of a superintendent furnished by the roads, the whole expense to be divided *pro rata* among the roads. Motion carried.

CENTRAL CLUB.

At the April meeting of the Central Railway Club, Messrs. Bronner, Wait and Petrie made a report on the subject of inspection of air brakes. We give an abstract below:

When it is considered that at the present time there are about 160,000 freight cars, equipped with the automatic air brakes, which is over 16 per cent. of the total equipment of the country, and that they are being applied at the rate of over 50,000 cars per year, the great and growing importance of the subject in hand will be appreciated. The cost to the railroad companies of the application of the brakes now on, over the cost of the ordinary single-hand brakes, has been about $80 per car, or a total expenditure of $12,800,000.

To realize on this investment and to derive the full benefits of the possibilities of the brakes is a question that requires immediate and wide-spread agitation. From the information at the command of your committee, the only conclusion to be reached is that air-brake apparatus on freight cars is generally neglected, resulting in a low average condition of the brakes, and showing that fully 25 per cent. of the cars now interchanged are disabled, or at least not in the highest condition of effectiveness as far as the brakes are concerned.

The causes which detract from or neutralize the effectiveness of the brakes are many, and among the most glaring are slack in connections, foul, gummy triples and cylinders, leaks of various kinds, and a lack of oiling. Some of these defects are easily and quickly repaired or remedied, such as taking up slack, cleaning and oiling triples or cylinders, and repairing leaks in some cases. This work could be done at a cost as follows:

Cleaning and oiling triple valve; cleaning and oiling cylinder; taking up slack in connections; putting new rubber seat on emergency valve, when necessary (when leather seat is found it must be replaced by rubber seat in all cases), 50 cents.

Repairing leak in main pipe, when section of pipe must be removed, 25 cents.

Repairing triple valve gasket, 30 cents.

In order to obtain the use of brake apparatus on cars being interchanged, it would be necessary under the existing condition of the freight brakes of the country to repair many foreign cars, with the defects above enumerated. The question arises, as to who should be responsible for the cost of the work. The owner of the car should be responsible for its condition, when found ineffective, due to natural wear and tear, the same as if it were for a worn out wheel. It appears to your committee that the most effective method of improving the freight brakes of the country, and enabling users to obtain the benefits, would be to inaugurate a more rigid system of inspection, and to fix a standard for interchange. This should be incorporated in the M.C.B. rules of interchange. It should be demanded that brakes on freight cars, offered for interchange, be in good working order, and that when found in ineffective condition from causes which are inherent, or for which the owner is responsible, it may be permissible for the company in whose possession the car is, to make necessary repairs, and charge the cost to the owner. In order to bring the matter up for discussion, your committee will attempt to formulate a set of rules to govern the interchange of freight air brakes, and would recommend that they be brought to the attention of the Executive Committee of the Association for discussion before the National Convention.

I.

Freight cars equipped with air brakes may be refused when the brake apparatus is not in good working order. To be considered in good working order, the following conditions must be fulfilled:

(a) Cylinders and triples must have been cleaned and oiled within six months.

(b) Cylinders must have been oiled within three months.

(c) Pistons must be adjusted so they will move not less than 4 or more than 9 in.

(d) Triple valves and auxiliary reservoirs must be free from water.

(e) Air hose must be coupled with another car, or coupled properly in the coupling hook.

(f) Brakes must apply and release instantly upon the proper movement of the engineer's brake valve.

(g) Pipe, connections, and all attachments must be absolutely free from leaks.

(h) Dates showing when cylinders and triples were last cleaned, oiled and tested must be marked plainly on cylinders.

(i) Brake shoes must be of sufficient thickness to run the length of the road without changing.

(j) All parts of brake rigging must be sound and in accordance with Rule No. 3, Section S, of M. C. B. code.

II.

When found on foreign roads in condition not fulfilling requirements in Rule I., the following named defects may be repaired or remedied and bill rendered against the owner: Cleaning and oiling triple valve, cleaning and oiling cylinder, taking up slack in connections, putting new rubber seat on emergency valve when necessary, repairing leaks in pipe, replacing triple valve gasket. When defects exist that are greater than above mentioned, or which would not be covered by the prices allowed, the air should be cut out and the owner notified.

III.

Price for work done shall be as follows:

Cleaning and oiling triple valve, cleaning and oiling cylinders, taking up slack in connections, putting new rubber seat on emergency valve, when necessary (when leather seat is found it must be replaced by rubber seat in all cases), 50c.

The above price to cover the first three items or all four.

Repairing leak in main pipe when section of pipe must be removed, 25c.

Repairing triple valve gaskit, 30c.

IV.

When work is done on brakes on foreign cars and tests are made, cars shall be marked as follows:

On the side of auxiliary reservoir, nearest side of car, stencil plainly in 1-in. letters "TRIPLE CLEANED" on upper half of reservoir and "TESTED" on lower half.

When triple valve has been cleaned and oiled, mark in chalk, under above, the date when done, and when brakes have been regularly tested on a test track or at shop, place proper date under word "TESTED."

A reservoir should look thus:

TRIPLE CLEANED.
3—30—91.
TESTED.
3—30—91.

On the brake cylinder stencil in 1-in. letters, "CLEANED" and "OILED," the dates to be put under the words in same manner as an auxiliary reservoir, thus:

CLEANED.
3—30—91.
OILED.
3—30—91.

In marking dates the month, day, and year to come in order named.

V.

Bills for air-brake work done, shall embody all necessary information as to nature of work done: Numbers and initials of cars, date and place, and date last oiled and cleaned, as shown on cylinder.

Your committee would also recommend for local inspection the adoption by all roads of the plan of having one or more points on their line where there shall be a special track or tracks set aside for the testing and repairs of air brakes. There should be at this point a full equipment of stationary boiler, air pump, reservoir, engineer's valve, and such convenient connections as will enable cars to have the air brake thoroughly tested on any part of the track. The following classes of air-brake cars should be switched out on to this track:

First—Home road cars which have not had cylinders oiled for over three months, or the triple valve or the cylinder cleaned for over six months, excepting only cars of above class loaded with stock, perishable or time freight.

Second—Home cars with brakes defective or inoperative from any cause, except cars with stock or time freight.

Third—Foreign cars with brakes defective or inoperative, except as above.

Fourth—Foreign cars which have not been tested since delivery from connections.

Fifth—All cars both home and foreign, with brakes inoperative, which have been passed on account of perishable or time freight or live stock, should be put on test track as soon as unloaded.

Sixth.—All empty cars which have not been on the test track of the road upon which the cars are within three months.

All cars set on air brake test tracks should have air applied on them, at regular train pressure, and an inspection made for leaks for amount of movement of piston, quickness of response to the movements of engineer's valve, also the dates, showing when cylinder and triple were oiled or cleaned and oiled. Cars should then be put in condition recommended under Rule 1, as shown heretofore.

In conclusion, your committee wishes to mention the new Westinghouse hand-book and call attention to its value, if properly used, and if the recommendations contained therein are carried out. Among the recommendations in it, which our investigations show are not followed, may be named the use of too much oil in oiling cylinders and triples; the neglect of blowing out pipes to remove scale, etc., as is evidenced by the amount of scale found in triples; the neglect of the precaution of hanging up couplings, and when hung the propensity shown to hang it by placing the hook of the dummy inside the port of the coupling, thereby injuring the gasket. We would also recommend that accurate account be kept at all shops and test tracks, of all air-brake work done on both home and foreign cars. The importance of the subject will undoubtedly commend investigation in this line to the railroad companies, and if this report should be the means of starting discussion and investigation, it will have answered a good pur pose

Train Heating.

The Committee on Safety Appliances, of the General Time Convention, made at the recent meeting in New York City a progress report, as stated in our editorial last week. The Committee feels warranted in assuming that all railroad companies would prefer to heat their passenger cars by some safer method than the ordinary stove if an efficient means could be found. In order to ascertain and express the opinions of the members of the Time Convention a circular was issued Dec. 1, 1890, and sent to every member. Replies were received from but 87 out of the 171 members. The Committee calls especial attention to this fact. The information collected from the 87 members of the convention who did reply is summarized below.

It is the conclusion of the Committee that companies controlling about 29 per cent. of the railroad mileage of the United States are practically testing some plan of continuous train heating. This percentage is increasing, and on the whole the Committee is of the opinion that at no remote period a solution of the problem will be had. The Committee will continue its efforts to secure the aid of all the members of the Convention toward collecting information on this subject. The answers to the questions submitted are as follows:

Do you consider it an essential requisite of train heating:

1. That the cars shall be heated, whether standing or running, whether in train or not, just as the stove will do?

A. Yes, 51; no, 10; unclassified, 9.

2. That some simple and efficient way for the regulation of the temperature shall be provided so that it may be ventilated, whether the train is running or standing?

A. Yes, 75; no, 1; unclassified, 4.

3. That some system of ventilation shall be used in connection with the heating?

A. Yes, 62; no, 14.

4. That the details be so designed that no materials shall be required peculiarly difficult to obtain?

A. Yes, 75; no, 1.

5. That the system shall be of reasonable cost?

A. Yes, 77; unclassified, 2.

6. That the appliances be so designed that cars shall be readily interchangeable?

A. Yes, 68; no, 6.

7. That it shall be harmless in a wreck?

A. Yes, 77.

8. That it exposes none to the risk of burning when in ordinary use?

A. Yes, 80.

9. That the system shall be so arranged that it will not suffer injury from freezing?

A. Yes, 80.

10. Please add any other items which you may deem essential requisites in train heating.

For the information of the Committee will you kindly answer the following further questions:

1. How many passenger cars have you in service heated by steam from the locomotive?

A. 3,171, reported by 49 roads.

2. What system or systems are used in such cars?

3. Please state whether any of the cars thus heated are supplied with hot water circulating stoves to which arrangements for heating by steam from the locomotive have been added?

4. Have you decided to apply any of the the systems to your passenger rolling stock? If so, of how many cars does this rolling stock consist?

A. No, 41; yes, 8; now equipped, 6. Total, 55.

5. (*a*) Have you experimented with any system or appliance not contemplating the use of steam from the locomotive? (*b*) If so, please advise the Committee briefly what such appliances are, and if any of them have been successful, whether you contemplate their use on your equipment?

A. (*a*) No, 69; yes, 5. (*b*) No, 60.

6. Have you tried any method which does away with stoves, but which uses neither steam nor hot water? If so, please inform the Committee what it is and how successful.

A. No, 73; yes, 2.

7. What is the longest train you have heated by steam?

The suggestions made under question 10 of the first heading, are that there should be standards for the location of the end of the train pipe and for the size of connections; that there should be automatic control of the temperature; interchangeable couplings; a safety valve to prevent excessive pressure, and capacity for storing heat. It is further suggested by several of the members that straight steam is not the correct system, but that hot water circulation or a return system is more desirable. It is also suggested by a number of the members replying that the water of condensation should be taken care of, to prevent drip.

There is but one response from a member using continuous heating extensively which expresses very decided disapproval of the present methods. That company has all, or nearly all, of its passenger equipment fitted for continuous heating. It says that neither the company nor its patrons have been satisfied. The reasons for dissatisfaction are freezing up of parts, difficulty of regulating temperature, expense and difficulty of heating cars before starting out. The conclusion of this company is that nothing has been devised that will give bet-better satisfaction than the Baker heater.

Only one member mentions the danger of steam heating due to the escape of steam into a car. Evidently this theory has not made much progress in the Time Convention.

Under the second head the answers to question 2 cannot be summarized. They include, of course, all the known systems of continuous heating. The same is true of question 3. Under question 7 the answers may be summed up as follows: The replies range all the way from 3 to 15 cars; 6 is the number of cars most generally run in one train so heated, but there are 12 responses showing over 6 cars to the train.

The last issue of the *Railway Review* contains a table showing the car heating equipment of most of the roads of the United States and Canada. The table shows the total number of cars, cars heated by steam, those heated by water and those heated by stoves. The data

for hot water are for independent heaters, such as the Baker and the Johnson.

The figures are as follows:

		Percent.
Total number of cars reported on	35,772	100
Cars heated by steam	9,017	26.7
Cars heated by hot water	9,118	27.0
Cars heated by stove	14,612	43.3
Engines equipped for steam heating	3,804	....

Some passenger equipment cars are not heated at all, which would account for the fact that the percentages above do not amount to 100.

The number of cars equipped for steam heating will undoubtedly surprise most readers. It will be seen to be very nearly equal to the number equipped with hot-water heaters. The following tables have been compiled from the large table of individual roads and are of particular interest. Table 1 shows the geographical distribution of steam-heated cars, and indicates very strongly the effects of legislation on this matter. Table 2 shows how little headway steam heating has made on some of the largest systems in the country; 15 lines, having over 11,000 cars, have, it is seen, but about 1,000 fitted for steam heating, and but 2,600 for heating by hot water circulation.

The reader who examines this article will perhaps recall what we said not a great while ago about the condition of suburban trains running out of Chicago. There will be found some of the heaviest passenger trains run in this country, running at very frequent intervals. These trains are very generally found to be heated with stoves, and we have noticed in many of them that no pretension was made that the stoves were protected from breaking or from scattering their contents in the case of wreck. One of the best uses that could be made of the table published by the *Review* would be to put it before the commuters on the Chicago roads.

TABLE NO. 1.

	No. of Cars.	Heated by steam	Per cent. heated by steam	Per cent. of total steam heated cars.
New England roads	3,488	1,648	27	21
New York roads	4,518	3,623	80	47
Others east of Chicago	10,630	1,746	16	22
Roads west of Chicago	8,858	717	8	10

TABLE NO. 2.

Name of road.	Total cars.	Heated by steam.	Heated by water.	Heated by stoves.
Atch., Top. & Santa Fe	512	4	66	442
Baltimore & Ohio	653	126	16	511
Chic. & Northwestern	544	31	101	412
C., B. & Q. System	650	2	162	486
Chic., Mil. & St. Paul	711	221	116	374
Chic., Rock I. & Pac.	371	118	117	136
Clev., Cin., Chic. & St. L.	412	228	78	106
Grand Trunk of Canada	842	31	293	518
Illinois Central	493	1	290	202
Missouri Pacific	486	2	223	261
Northern Pacific	378	....	177	201
Penn. System	2,571	206	403	2,362
Philadelphia & Reading	643	8	176	448
Southern Pacific	810	....	202	576
Union Pacific	622	36	171	415
Total	11,098	1,914	2,591	7,450

The Roberts System of Car Heating.

The cuts, figs. 1, 2 and 3, show the details of piping and arrangement of valves for the Roberts system of car heating, which is being used on the Baltimore & Ohio and some Western roads in Ohio and Illinois. Figs. 4 and 5 show the metallic pipe coupling used with this system.

Combined with the heating system there is also a system of ventilation which has proved successful in service. The heaters are made of cast-iron in short sections, joined with pipe nipples, as shown in fig. 3, and placed at the side of the car, as shown in fig. 1, leaving a space of about 2½ in. for ventilation. Through this ventilating space pass the steam pipes to the ends of the car, where they are joined to the cast-iron heaters through which the steam returns to the centre of the car. Below the ventilating space there are openings in the floor of the car through which passes the air for ventilation, up and around the direct steam pipe, as shown in fig. 1. In this way the entering air is heated before it reaches the car.

On the plan, fig. 2, the arrangement of the piping is shown. Steam passes from the train pipe through a reducing valve, shown in fig. 1, directly to two globe valves under the seats, thence horizontally to the steam pipe in the air space, thence to the end of the car, where it enters the cast-iron heater; returning through the heater, the steam passes to a common drip, as shown in fig. 1. An auxiliary drip is also provided as shown. This arrangement combines both the direct and indirect systems of heating.

An automatic temperature regulator, not shown, controls the reducing valve and shuts off steam when the desired temperature is reached. The drip valve is automatic. The pipe in the air space pitches toward the ends of the car, and drains into the cast-iron heaters.

The coupling, shown in figs. 4 and 5, is entirely metallic. It consists of a vulcabeston washer, *A*, backed by a brass connection, *B*. The coupling locks by rotation, and a tight joint is made by the spring shown. To make the coupling automatic, a lug, *C*, is cast on the coupling, which, when the train pulls apart, strikes a projection on *B* which causes the coupling to revolve and thus become unlocked. At the bottom of the metallic connections, at the lowest point, there is provided an automatic drip, which consists of a valve, *E*, surrounded by a perforated cage *D*, which opens automatically by means of the spring shown, whenever the steam pressure is removed from the train. The drip can be removed and cleaned at any time by unscrewing the cap *F*. The universal joint on the end next the car is made by two pieces of vulcabeston, in the form of annular rings surrounding the spherical end on the metallic connection. Wear is taken up by revolving the screwed cap shown, thus compressing the rings *G* and *H* together upon the sphere. To prevent the cap from loosening the spring clip *J* is arranged to catch into recesses on the shell of the universal joint.

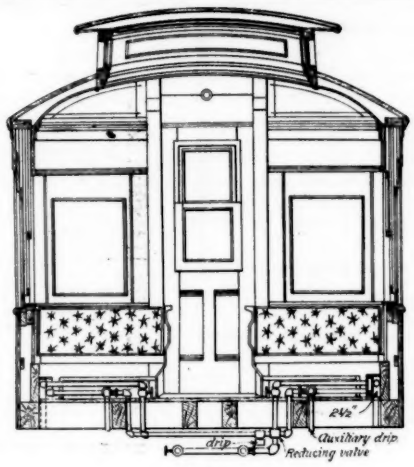


Fig. 1.

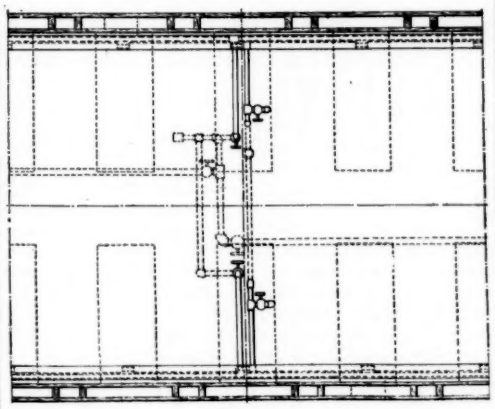


Fig. 2.

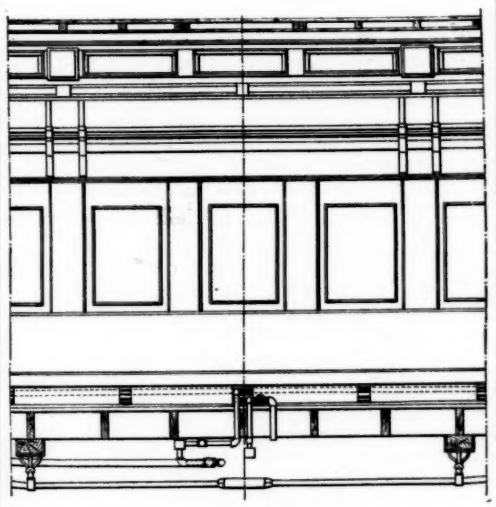


Fig. 3.

Roberts' Car Heating System.

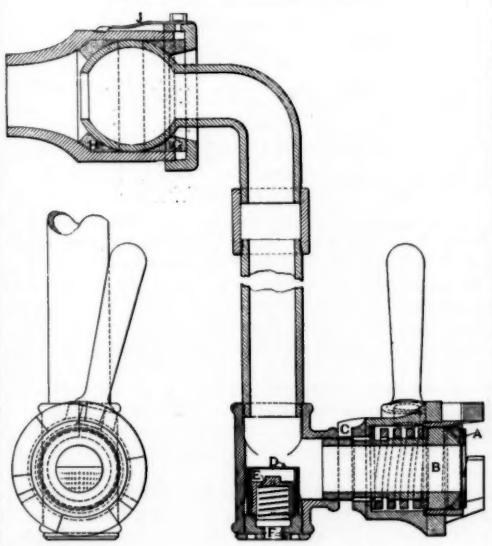


Fig. 5. Fig. 4.

Roberts' Metallic Pipe Coupling.

An Automatic Track Recorder.

One of the Northwestern roads has recently been experimenting on track inspection cards in an attempt to get some satisfactory continuous record in black and white of the condition of the joints and other weak spots in the track. For this purpose a small velocipede car has been fitted with a leading wheel, any vertical motion in which would be conveyed through a bell crank to the plunger rod in a Boyer speed recorder, to which is attached a pencil point which indicates on the revolving paper all irregularities in the surface of the rail. In order to make the markings intelligible it became necessary to speed up the drum considerably by means of large wooden wheels, worked from the axle by twisted belting. It is now proposed to place the indicating wheel between the forward and back wheels of the truck in one of the officers' cars, and in this way obtain more accurate results. Of course, any diagram taken from a velocipede car would not show any holes in the road-bed where the rails happened to remain suspended, but simply flat spots, battered ends, and permanent set of the rails.

Any means which will illustrate graphically, as the dynagraph car does, the surface of the road-bed, should be advocated by those interested in the maintenance of way, as it allows one to easily note the bad or inferior sections of the line, and "get after" the proper persons; for, although a man's judgment of the riding of a track depends frequently on attending circumstances, such as a worn-out track or the brightness of the day, or a bad dinner, there is little opportunity for any personal equation in a well-made mechanical contrivance of this sort, and one might reasonably expect that equally good sections of track should give equally good paper records.

These records should be dated and kept on file, and in a year or two the improvement or otherwise may be commented on by the superintendent, and any arguments he may make will carry more weight than is now often the case. When a road does not wish to incur the expense of a dynamometer car with the incidental cost of running it over the line, some mechanism of this kind may be easily put into the general superintendent's car, and diagrams taken by him whenever desired while going over the road with subordinate officials. He might in this way overcome the small stockholder's objection to private cars by proving that his particular car was a necessary adjunct in the maintenance of the standard of their track.

Oil-Mixing Plant of the Lehigh Valley Railroad.

BY C. P. COLEMAN, CHEMIST L. V. R. R.

II.—Laboratory and Operation.

Erection and Equipment.—The laboratory is at South Bethlehem, Pa. The building was erected by Mr. W. F. Pascoe, Superintendent of Bridges, under the direction of the Chemist, from whose designs the plans were drawn. Work was begun in the spring of 1888, and completed in September of the same year.

The building is a frame structure, resting on a stone foundation, the exterior sides being sheathed with corrugated galvanized iron and roofed with slate. The interior finish is of Georgia pine throughout. It consists of three rooms, as shown by the ground plan in fig. 7—the office, 15 ft. × 19 ft. 9 in.; the chemical laboratory, 16 ft. × 19 ft. 9 in., and the testing laboratory, 16 ft. × 19 ft. 9 in.

The chemical laboratory is equipped with laboratory table, steam box or hood, balance table, instrument case, sink, sample shelves and all apparatus necessary for chemical analyses. The special features of the room are:

1st. The laboratory table, a sketch of which is shown in figs. 8 and 9, which is a table with a soapstone top and shelving, drawers and closets for chemicals and apparatus, with gas, steam, water and drain connections conveniently arranged on top.

2nd. The steam box or hood, fig. 10, consisting of steam bath and gas fixtures, and out of which a flue, shown in ground plan, carries off the fumes.

3rd. The balance table, fig. 11, consisting of a 1,000-lb. casting, suspended by ¾-in. iron rods from a 9-in. × 6-in. iron-bound girder, the ends of which rest upon the base beams of two of the roof trusses. This arrangement does away with the vibrations of the balance needle, which were caused, when the balance rested on an ordinary table, by locomotives passing over the tracks within 10 ft. of the building, to the turntable.

The testing laboratory is equipped with photometer, sink, distilling apparatus, ammonia and ice and salt cold test boxes. It is also designed to admit of putting in a physical testing machine, if it be so desired in the future. The building is heated throughout by steam, and has been found to meet every requirement of the work of the department.

Operation.—Under this head will be given as concise a statement as possible of the regular routine of opera-

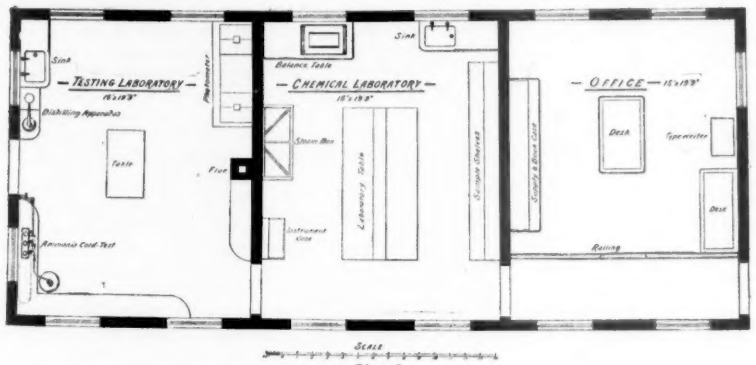


Fig. 7.

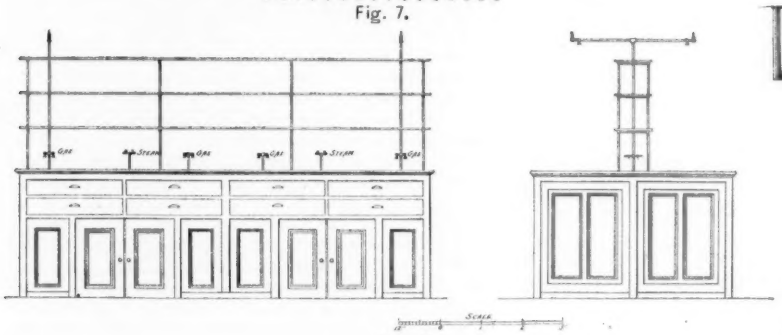


Fig. 8.

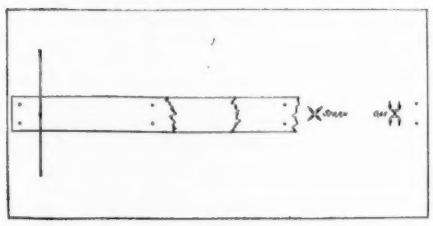


Fig. 9.

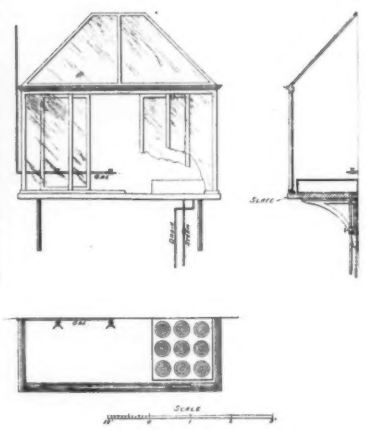


Fig. 10.

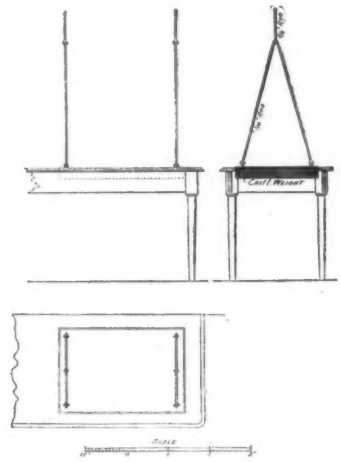


Fig. 11.

LABORATORY OF THE LEHIGH VALLEY RAILROAD.

tion. This will include the methods of purchasing, crude stocks purchased, specifications, tests, methods of mixing, etc., together with a condensed statement of the comparative financial results attained.

Work was commenced on the 1st of October, 1888, in a small way, and on the 1st of December of the same year the entire supply of oil and waste for the entire system was given to this department. Considerable preliminary work was necessary before the department was in condition to commence operations, such as the establishment of the manner in which materials were to be purchased and received, specifications for the materials and tests governing the same, organization o the force employed, and a systematic method of accounting. The first set of specifications had to be recalled on account of errors, and the set given in this article substituted for them.

In December, 1888, the following circular was issued and still remains, in force:

On and after Dec. 12, 1888, all lubricating and illuminating oils, tallow, grease and waste used by this company must be ordered by special requisition on the Chemist—O. W. Form 22.

In making requisition for oil the amount must be given in gallons, allowing 50 gallons to the barrel.

In making requisition for tallow, grease or waste the amount must be given in pounds.

Requisitions should be made at least two weeks previous to the time at which the material is needed.

If, when received, the oil, tallow, grease or waste is found to be in bad condition a sample of the same, together with a letter stating the facts fully, should be sent to the Chemist, South Bethlehem, Pa.

In ordering oils for special purposes, mention should be made in requisition for what purposes they are to be used.

All empty barrels, waste bagging and hoops must be sent to oil works, Perth Amboy, N. J.

In ordering observe the following:

BRAND.	USE.
Signal	Hand lanterns, train-signals, lanterns, water and steam gauge, semaphore and switch-signal lamps.
150° test	Headlights, Ireland signal lamps, telegraph towers, ticket and other offices and stations not otherwise provided for.
Passenger-engine oil	On all passenger-engine machinery.
Passenger-car oil	Passenger-car lubricator.
Locomotive-cylinder lubricant	Cylinder lubricant on all engines having "sight-feed lubricator."
Marine-cylinder lubricant	Cylinder lubricant on the lake boats and tugboats.
Bolt-cutting mixture.	Bolt-cutting and nut-tapping.
300° test	Lighting passenger cars.
Well oil	Freight and coal-car lubricator. For miscellaneous greasing in foundry and elsewhere.
Engine oil	On all engine machinery, except that of passenger engines, and in engine and tender truck boxes. Shop machinery.
Belt dressing	Dressing of belts.
Miners' mixture	Miners' lamps.
Stationary-cylinder lubricant	Stationary-engine cylinders.
Machinery oil	Shop machinery.
Cooling compound	Cooling journals, etc.

In short, all oil used on the road is ordered by the different departments from the Chemical Department, each being governed in ordering by the above circular. All of the oil and waste ordered is supplied from the works at Perth Amboy, which place obtains its supplies by requisition from the Chemical Department, approved by the Assistant to Second Vice-President, on the Purchasing Agent of the Company, who is governed by the circular "Conditions of Shipments" and the specifications in making his purchases. The circular "Conditions of Shipments" was issued in order to inform those supplying the materials, of the Company's manner of purchasing and receiving, and of the condition in which the goods must be when delivered. The circular is as follows:

After this date, all oil used for illuminating and lubricating purposes will be purchased and received in the following manner:

1. All oil will be purchased and received by weight.
2. All packages containing lubricants and burning oils, must be strictly prime and in good condition with the name of the contents and consignee's address marked on each package, together with gross and tare weight, which will be subject to company's weight.
3. When received, all shipments will be weighed; and, where practicable, will be emptied, and the empty packages weighed. Where impracticable to empty all, ten per cent. will be emptied, and the tares taken; the weights of the whole shipment will be adjusted in accordance with those of the ten per cent, taken. Should the net weights obtained in this manner be more than one per cent. less than the amount charged in the bill, a reduction will be made for all over one per cent.
4. Oils for all purposes will be purchased by sample. Samples of not less than one quart each, of such oils as they are willing to furnish, will be forwarded by bidders, in tin cans, and upon the results of the examinations of such samples a selection will be made. Shipments will be required to conform to samples and specifications in every case. Prices should be sent with samples.
5. Shipments of oil one or more barrels or tanks of which are cloudy from glue or other impurities, or contain any admixture of other oils or dirt, or any adulterants whatever, will be rejected and returned at the expense of the shipper.
6. A separate bill, giving number of pounds, must be rendered for every shipment, however small, even though it be a portion of the whole order; and bill must be sent as soon as possible after shipment is made.

As far as it is possible paragraph No. 1 of the circular is carried out; but, owing to the fact that the greater number of those supplying these materials still hold to the old manner of quoting by the gallon, the company has established the weight per gallon for each of the brands which it receives. These weights are based upon the specific gravity (at 60 degrees Fahr.), of each oil, and are as follows:

Gasoline, 88 degrees	5.58 lbs.	per gallon.
150-degree oil	6 60 "	"
300 " "	6.96 "	"
Red engine oil	7.34 "	"
Well oil, zero degrees, C. T.	7.33 "	"
Well oil, 15 " "	7.34 "	"
Well oil, 35 " "	7.40 "	"
Cylinder stock	7.50 "	"
All animal oils	7.50 "	"

Before deciding upon the manner in which shipments should be checked, the question was very thoroughly looked into and the two methods carefully considered, with the result that that of taking the number of pounds was found to be more accurate and fairer to both the shipper and the company than the old way, *i. e.*, gauging to obtain the number of gallons, as it eliminated the factors of error, of difference in temperature, personal equation in gauging, loading on grade, etc. The results obtained from this method have been entirely satisfactory. Paragraph No. 4 of the circular protects the shipper in that his material is examined and approved before the shipment is made, and in that way, if material corresponds to sample, insuring its receipt upon delivery at Perth Amboy, thus avoiding the expense of having his material returned to him on account of failure to conform to specifications. Paragraph No. 3 governs the shipment on receipt by the Company. When a shipment is received, a sample is taken at random from any package of the shipment and forwarded to the Chemical Department at South Bethlehem, Pa., where it is examined and tested in accordance with the the specifications. If it is found to conform to them, the approval of the lot is forwarded to the Foreman of the works. Upon receipt of this approval each package of the shipment is weighed, and tare taken, or approximated, as stated in the paragraph. The net weight is forwarded to the chemical department on the following form:

REPORT OF MATERIALS RECEIVED.

.....189

Lot No.	From.	Brand.	Amount.		
			Lbs.	Galls.	Tank or Bbl.

Remarks:

Specifications, Tests, Crude Stocks, etc.—By crude stocks is meant those stocks purchased, so-called to distinguish them from those oils which are compounded. The specifications for crude stocks which are to follow are those which have been last issued, and have been found to cover the necessary qualifications for the best results in service. Following each specification is given the use to which the oil is put and the tests to which it is submitted, where it is deemed advisable to do so.

Petroleum Illuminating Oils.

105 *degrees Fahr. flash test* (*Elliott closed cup*), (150 *degrees Fahr. fire test*). The flashing point of this oil must not be lower than 105 degrees Fahr. It must be clear, water-white in color, and not become cloudy when cooled to 0 degrees Fahr. It may have a specific gravity between 44 and 48 degrees Beaumé, 60 degrees Fahr.

120 *degrees Fahr. flash test* (*Elliott closed cup*), (175 *degrees Fahr. fire test*). The flashing point of this oil must not be lower than 120 degrees Fahr. It must be clear, water-white in color, and not become cloudy in color when cooled to 0 degrees Fahr. It may have a specific gravity between 45 and 49 degrees Beaumé, at 60 degrees Fahr.

235 *degrees Fahr. flash test* (*Elliott closed cup*), (360 *degrees Fahr. fire test*). The flashing point of this oil must not be lower than 235 degrees Fahr. It must be clear, standard white in color. It may have a specific gravity between 38 and 43 degrees Beaumé, at 60 degrees Fahr.

NOTE.—The tester employed to determine the flashing point will be the "Elliott Closed Cup," also known as "New York State Tester."

The oil in each case will be heated at a rate not exceeding 5 degrees per minute.

105-degree Fahr. flash is used for headlights, Ireland signal lamps, telegraph towers, heater cars and in compounding signal and navy signal oils; 120 degree Fahr. flash is used for switch lamps; 235-degree Fahr. flash is used for lighting passenger coaches and in compounding signal and navy signal oils.

The tests of these oils for flashing point are all made in the closed cup known as the "Elliott," and heated as stated in the specifications. The testing torch used is a glass tube, the end of which is drawn down so as to emit a flame about one-eighth of an inch in length. Every two degrees' rise in temperature this flame is put into the closed portion of the cup (care being taken to prevent contact with surface of oil) for a fraction of a second. The application commences from a point about 10 degrees below the desired flashing point, until the first flash is obtained. This is called the flashing point of the oil. The specific gravity is taken with the Beaumé hydrometer, and the result checked by a Westphal balance. The gravity is taken at 60 degrees Fahr The cold-test of zero degree Fahr., specified for in the case of the first two oils, is made necessary on account of the exposed positions in which these oils are used, and that this test shuts out those oils which are not properly refined. The test is made in a four-ounce bottle, which is placed in a box containing ice and salt. The temperature at which the first cloud appears is called its cold test.

A more complete description of the manner of making the cold test is given under "Well Oil."

Well Oil

This oil must be pure petroleum, and free from any adulterations; must be transparent, of a reddish brown (not black) color, when placed in a thin layer on a glass plate, and held in a vertical position between the observer and the light, and of a transparent greenish color, when held in a horizontal position, and must be perfectly free from specks, lumps, dirt, grit and water.

Preference will be given to those shipments which are lowest in tarry matters and ash.

This oil must not lose more than one-quarter of one per cent.

in weight when kept for three hours at a temperature of 100 degrees Fahr.

Three grades of well oil will be used:—

1. *Summer Oil.*—March 15 to Sept 15, flashing point not below 350 degrees Fahr.; cold test not above 40 degrees Fahr.

2. *Fifteen Degree Oil.*—Sept. 15, to Nov. 1, flashing point not below 275 degrees; cold test not above 15 degrees Fahr.

3. *Zero Oil.*—Nov. 1 to March 15, flashing point not below 250 degree Fahr.; cold test not above 0 degrees Fahr.

This oil may have a specific gravity of 29 degrees Beaumé, or lower, at 60 degrees Fahr.

NOTE.—The flashing point of this oil will be obtained by heating the oil at the rate of 10 degrees per minute, in the open cup known as the "Cleveland," applying the torch every 5 degrees.

Well oil is used for freight and coal car lubrication, miscellaneous greasing and in compounding engine and passenger car oils.

The flash test is obtained by the use of what is known as the "Cleveland cup." This consists of an open cup, made of copper, resting in a larger cup of the same material, the space between the oil cup and the enclosing one being filled with sand, thus insuring a more uniform temperature in the oil cup. The torch is the same as that used for illuminating oils. The test is made by passing the torch over the edge of the cup within about ⅛ in. of surface of the oil. This is done every five degrees from 25 degrees below the specified flash point until the flash point of the oil under test is reached. The test for the amount of ash is made in the ordinary way. The test for tarry matters is made by taking five cubic centimetres of oil and 200 cubic centimetres of gasoline, the number of cubic centimetres of tarry matters deposited being the per cent. contained in the oil. The cold test is made as follows:

A 4-oz. bottle is taken, into which is placed 2 oz. of the oil to be tested, the thermometer is then put in so that the bulb will be in the centre of the oil; the temperature is then reduced by means of salt and ice placed in a box arranged for that purpose; as the temperature becomes lower the oil is from time to time inspected by tilting the bottle to see if the oil still continues to flow. The temperature at which the flowing ceases is called the cold-test. The test is made without stirring the oil.

Paraffine Oil.

The flashing point of this oil must not be lower than 280 degrees Fahr., when the oil is heated in an open cup, at the rate of 15 degrees per minute, the flame being applied every five degrees, commencing at 200 degrees.

It may have a specific gravity of 25 degrees Beaumé, or lower, at 60 degrees Fahr.

It may have a cold test of 32 degrees Fahr., that is, it must not become cloudy at this temperature.

The open club used for getting the flashing point of this oil will be that which is known as the "Cleveland Cup."

This oil is used in compounding passenger engine oil. The tests are conducted in the same manner as those for well oil.

560 Degrees Fahr. Flash Petroleum Cylinder Stock Oil. (660 *Degrees Fahr. Fire Test.*)

The flashing point of this oil must not be lower than 560 degrees Fahr., when the oil is heated in an open cup, at the rate of 15 degrees per minute, the flame being applied every five degrees, commencing at 450 degrees.

It may have a specific gravity between 24 degrees and 28 degrees Beaumé, at 60 degrees Fahr.

It must not lose more than one-half of one per cent. in weight, when kept for three hours at a temperature of 350 degrees Fahr. It must be transparent and free from lumps or specks, and must be of a reddish brown (not black) or greenish color, when held in a thin layer, on glass, between the observer and the light.

NOTE.—The open cup used for getting the flashing point of this oil will be that which is known as the "Cleveland Cup."

This oil is used for compounding locomotive cylinder lubricant and as cylinder lubricant for marine equipment and stationary engines. Tests are made in a manner similar to those already described.

Tallow.

This must be made from beeves, and be what is known on the market as "acidless tallow."

It must contain no dirt or cracklings disseminated through it, or in streaks, nor must it have a layer of dirt or cracklings in the bottom of the barrel of more than one-eighth (⅛) of an inch in thickness.

It must melt to a clear liquid, showing no appreciable sediment, and upon burning to an ash, must not leave more than one-eighth of one per cent. (⅛ per cent) of such ash.

Its specific gravity must be between 32 degrees and 33 degrees Beaumé, at 212 degrees Fahr.

It must not contain soap or other substances not properly belonging to tallow.

It must contain less than one and five-tenths (1.5) per cent. of free fatty acid.

It must be entirely soluble in ether, and must not be scorched or burned.

NOTE.—To persons furnishing tallow, who have not the appliances for determining the amount of free acid, it may be said that if the fat is rendered within 12 hours from the time the animal is killed, using a temperature of not more than 225 degrees or 250 degrees Fahr. during the rendering, it is believed that the free acid in the tallow will be less than the amount specified above. In very warm weather it may be necessary to render the fat in less than 12 hours after the animal is killed.

This material is used in compounding locomotive cylinder lubricant. The specific gravity test is made in the same manner as that for the petroleum oils, except that it is made at a higher temperature. The acid test is the most important one made on this material, as it is also in the case of all the animal oils. Free fatty acid is what, in most cylinder oils, causes the greatest damage to the cylinders, in that it attacks the metal, causing pit holes and the eating away of the metal. It is therefore desirable to have as little of it as possible present. The specifications, for this reason, in the case of each of the animal oils, limits the amount of free acid in each oil according to the purpose for which it is to be used. The test for free acid is as follows: Take 56 cubic centimeters of 95 per cent. alcohol and warm it to about the temperature of the human body, and 10 drops of phenolphthalein. Fill the burette, to top of graduation with potassium hydrate, then add solution drop by drop to the alcohol solution until it assumes a slightly pink tint. Fill again to top of graduation, run in 10 cubic centimeters of oil to the alcohol, then add potassium hydrated solution from the burette, shaking frequently, until the solution changes red again. The red color should remain after the last thorough shaking. The number of cubic centimeters and tenths of potassium hydrate that have been used divided by two gives the per cent. of free acid. The same course is pursued in determining the acid in tallow with the exception that the alcohol is heated a little higher and the tallow melted before being measured by a pipette.

"It must be entirely soluble in ether;" this means that it must not contain materials which will not dissolve in ether, and is introduced in the specifications in order to prevent the use of materials which are somtimes added to tallow in order to increase its weight.

Prime Lard Oil.

This oil must be that which is known on the market as the "prime."

It must show no appreciable sediment, and upon burning to an ash, must not leave more than one-eighth of one per cent. (⅛ per cent) of such ash.

It must be entirely free from other oils.

Its specific gravity must be between 22 degrees and 24 degrees Beaumé, at 60 degrees Fahr.

It must contain less than one and five-tenths (1.5) per cent. of free fatty acid.

It must not become cloudy above 40 degrees Fahr.

This oil is used in compounding signal and navy signal oils which are employed for illuminating purposes. The specific gravity and free acid tests are made in the same manner as previously described. The cold test is the temperature at which the first distinct cloud appears. The cold test is insisted on between October 15th and April 15th. The test for purity, *i. e.*, freedom from admixture with other oils, such as cottonseed, neatsfoot, petroleum, etc., is Maumene's. This is the rise in temperature occasioned by the mixing of a specified amount of oil of vitriol and the oil to be tested. Each kind of oil has a characteristic rise in temperature. Thirty centimetres of the oil of vitriol are put into a beaker and to this 15 centimetres of the oil are added, both being at the same temperature, and the rise noted by the thermometer which is used to mix the two together. The test is a simple one and fairly accurate if care is taken to have the tests uniform. The greatest chance of error lies in the beaker and the thermometer, both of which must be standardized, as different beakers and thermometers will give different results. The acid also must be standardized by noting the rise in temperature with pure oil. Most of the animal and vegetable oils have a much higher rise in temperature than has lard oil, while petroleum is much lower.

Millian's modification of Bechi's test with nitrate of silver, and Hubl's test with iodine are used as checks for Maunene's test.

Extra No. 1 Lard Oil.

This oil must be that which is known on the market as "Extra No. 1."

It must show no appreciable sediment, and upon burning to an ash, must not leave more than one-eighth of one per cent. (⅛ per cent.) of ash.

It must be entirely free from other oils.

Its specific gravity must be between 22 and 24 degrees Beaumé, at 60 degrees Fahr

It must contain less than fifteen (15) per cent. of free fatty acid.

It must not become cloudy above 40 degrees Fahr.

This oil is used for compounding passenger engine, engine and passenger car oils. The tests are made in a manner similar to those already described under prime lard oil.

Prime Neatsfoot Oil

This oil must be that which is known on the market as "Prime."

It must show no appreciable sediment, and upon burning to an ash, must not leave more than one-eighth of one per cent. (⅛ per cent.) of such ash.

It must be entirely free from other oils.

Its specific gravity must be between 22 degrees and 24 degrees Beaumé, at 60 degrees Fahr.

It must contain less than one and five-tenths (1.5) per cent. of free fatty acid.

It must not become cloudy above 40 degrees Fahr.

No. 1 Neatsfoot Oil.

This oil must be that which is known on the market as "No. 1."

It must show no appreciable sediment, and upon burning to an ash, must not leave more than one-eighth of one per cent. (⅛ per cent.) of such ash.

It must be entirely free from other oils.

Its specific gravity must be between 22 degrees and 24 degrees Beaumé, at 60 degrees Fahr.

It must contain less than fifteen (15) per cent. of free fatty acid.

It must not become cloudy above 40 degrees Fahr.

These oils are used as substitutes for prime and extra No. 1 lard oils when the market price warrants such substitution. The tests are made in the manner already given.

Tallow Oil.

This oil must be strictly prime and pure and pressed from beef tallow.

It must show no perceptible sediment, and upon burning to ash, must not leave more than one-eighth of one per cent. (⅛ per cent.) of such ash.

It must be entirely free from other oils.

Its specific gravity must be between 23 degrees and 25 degrees Beaumé, at 60 degrees Fahr.

It must contain less than one and five-tenths (1.5) per cent. of free fatty acid.

It must be limped and transparent at 70 degrees Fahr.

This oil is used at times as a substitute for tallow. The tests are made in a manner already given.

Waste.

While no printed specifications are issued for this material, yet a sample from each lot is examined and acceptance of waste depends upon this examination. The sample is an average one, and is taken at random from any bale in the shipment. The qualities expected are as follows: *For woolen waste*, 90 per cent. of pure wool yarn and cotton cop (the wool being at least 60 per cent. of the weight), and not more than 10 per cent. of dye, dirt and moisture or foreign substance. The life and spring of the waste should be preserved and it should contain no jute. The method of analysis is as follows: Moisture, by loss of weight after being kept for several hours at 212 degrees Fahr.; oil and dirt, by washing with naphtha, drying and weighing the clean waste; wool, by treating the clean waste with sulphuric acid, which cuts out the cotton, etc., and leaves the wool; cotton, by treating with caustic potash, 1.02 degrees B., specific gravity, which cuts out only the wool, leaving the cotton, jute, etc. *For white cop waste* must be soft and clean and free from all foreign substances. *For colored wiping waste* must be colored cop waste free from all foreign substances. *For colored packing waste* must contain no grit nor other foreign substance which would be injurious to journals, must be made up principally from colored cop waste. The method of analysis is as follows: Wash a weighed sample with naptha, dry and weigh; loss equals dirt, oil, etc. It was the original intention to have all waste stored at the works, and supplies from the various departments drawn from there, but owing to the need of more storage space for oil this was not carried out. The requisitions, however, for this material are made on the Chemist, and records and accounts are kept by the Chemical Department.

Wrecking Outfits and Handling Wrecks.*

BY P. W. HYNES, WRECKING FOREMAN, B. C. R. AND N. R. R.

VIII.—PASSENGER COACHES AND ENGINES.

Passenger coaches, owing to their weight peculiar construction and greater value, may not be handled by the rapid methods used in taking up freight cars. The passenger coach is very stiff and heavy below the window sills, and extremely light and frail above them. Therefore, when a coach lies upon its side there is no point from which a lift can be safely given to right it. If, however, the strain can be distributed to a sufficient number of points this difficulty is overcome.

Suppose a coach to be lying on its side near the track and nearly parallel to it. The trucks should be first removed and also the brake reservoir and apparatus. A rope about 200 ft. long should be arranged in five or six loops so that the bight of each loop will pass through a ventilator window on the lower side of the coach, being passed around a piece of blocking placed as a cleat bearing on the posts at each side of the ventilator. This will give five or six points to lift by, and they should be evenly distributed through the length of the coach. The cleats should be carefully padded to avoid marring the interior wood-work. The loose end of each loop will be carried to the middle of the car, passing over the roof and upper side, so as to converge at a common centre. Here they are attached to the tackle which leads from a "deadman" so placed that the hauling line will have a fair lead to the locomotive. Having completed these preparations, a season of light traffic may be chosen to cut the main track and throw it over under the coach so as to protrude a rail length beyond the further end. A truck is run out on this track past the coach, and the car is then turned over onto the sills and placed on trucks by means of the derrick and the "horse and saddle,' as was done with freight cars. Some coaches will be found too heavy to be safely handled by means of the "horse and saddle," and in such cases it will be better to raise the end of the car by means of jacks and blocking to admit the truck.

When a number of coaches have been derailed and thrown sufficiently clear of the main track it will often be found economical to lay a temporary track close to the coaches in such a way that the derrick can be used advantageously without interfering with the regular traffic. This track may be so arranged that it can be connected from time to time with the main track, and should be long enough to give standing room at one end for a few of the coaches taken up. If the coaches have gone down a bank the temporary track may be laid at the foot of the slope and carried up to the level wherever the grading becomes practicable If it is not possible to let the derrick down to them the work may be done by jacks and by tackles worked by a locomotive from the main track. Elaborate preparations would not be appropriate in cases where the coaches are greatly damaged, and at such times the principal object will be to get the track clear. For such work the methods already outlined for clearing freight wrecks may be profitably employed.

In the matter of handling locomotives perhaps the most important point is to secure a safe hold for the tackles. This is sometimes furnished by a stout tree or stump, but failing these we resort to a "deadman," which is a log sunk in the ground. The distance of this log from the locomotive is of less importance than other considerations. About 80 feet will usually answer, with tackles on the "Burton" principle, though it may be several times that distance if the ground require it but the further the "deadman" is from the work the greater will be the liability to twist in the tackles and the consequent absorption of power. As to the holding power of the log, this depends mostly on the angle given to the

* Copyright, 1890, by P. W. Hynes.

score through which the lead passes and on the nature of the ground, and the manner of digging the trench. The side nearest to the wreck should be perpendicular and straight so as to offer an even bearing to the log. In swampy ground I have used sheet piling to a depth of three feet to advantage, taking the siding from damaged box cars for the purpose. Often the strain can be divided between two or more sunken logs placed eight or ten feet apart. I once tried to place a "deadman" in twenty inches of soil which was entirely underlaid with flat rock. Fortunately it was cold weather, and by letting the log lie over night we froze it in its bed and had very good holding. In making the lead from the "deadman" it is better to use chain than rope, both because of the dampness and the tendency of rope to turn and impart a twist to the tackles.

Great difficulty is always experienced in disconnecting the tank and engine when either or both are badly derailed. I usually move one or other slightly to ease the strain on the kingbolt, and then force it out by means of a jack. For this purpose I have in the tool-car three pieces of 1¼-in. round iron with ends turned square, and respectively 3, 6 and 10 ins. long. As the kingbolt passes beyond reach of the shorter piece a longer one is substituted. Very often I do not disconnect the engine and tender when I think others would do so, as in the case of a run-off, where the engine has the drivers on one side down deep in the ballast, while the tender remains on the ties. All that is necessary is to right the engine and put blocking, and if practicable a rail under it before straightening up the engine, and then haul them together on to the track. See that the forward engine truck is secure, or make it so by chaining, then pass a chain around the dome of the boiler protecting the outer casing by blocking, and from this lead a tackle to a "deadman," passing the hauling line to the wrecking engine. As the disabled engine rises, follow it up with substantial blocking till it is level. I believe it is always unwise to attempt to pull a leaning engine to the track without straightening it up, because the pull on it is the resultant of the horizontal strain on the tackle and the weight on the low wheels on the low side which may throw the engine on its side. In making a longitudinal pull it is often possible to attach the tackle to a rail, and I find the best way to prevent slipping is to take a couple of turns around the rail with a ⅞-in. chain leaving end enough to hook the standing part of the chain with the grab-hook. If this should not be strong enough to bear the strain, a chain may be made fast to each rail and the strain divided between them. When an engine is lying on its side, whether down the bank or on a level with the track, it may be handled most readily by means of powerful tackles. If a heavy engine with a long frame lies at the foot of a bank on its side and at an angle to the track we have one of the difficult complications to meet. We should build an incline from the track down to the engine, get the engine in line with the incline, turn the engine upright and haul it up the grade. Having determined the centre line of the most practicable incline, let the engine be swung into line with it, and a good firm bed of ties laid so as to receive the drivers and truck wheels when the engine is righted. A powerful tackle may then be rigged so as to give a "fair lead" to a locomotive on the main track, and to bring the purchase to bear upon the dome of the disabled engine, or the ends of a long chain may be secured to the frame on each side, the bight or double of the chain being led up over the boiler and the tackle attached to it, blocking being used to keep it off the jacket. If the truck is disabled blocking should be placed to receive the front end of the frame and hold it up high enough to admit jacks with which to raise the front end so as to replace the truck. The engine being righted and rails placed under the wheels such parts as will interfere with the running should be removed, but all indiscriminate stripping should be discouraged. If it is not possible to get the engine into good line with the track it may be possible to curve the track sharply to meet the engine, and as a very long frame would give trouble in passing a sharp curve it is sometimes well to jack the frame up and block it in front and rear, so that the middle wheels will clear the track an inch or two. I have had to do this on one or two occasions, but on this road we have appliances by which we can easily and quickly turn any engine so as to accommodate itself to the track without using jacks or damaging the engine.

The easiest, quickest and safest way to replace any wrecked engine on the track is to cut through the track; that is, remove the rail which the wheels nearest the track must cross, and pull the engine on. In cases of simple derailment, when all the engine wheels may be on the ground, where it is not desirable or convenient to cut the track, first get all the wheels close to the track, and in the case of eight-wheeled engines get the truck on first (if pulling ahead). It is good practice to get the two pairs of drivers on together, although the wheels of long-coupled engines may be replaced one pair at a time.

In replacing Mogul, 10-wheeled, consolidation or decapod engines, it is good and safe practice to replace all driving wheels at one movement. It is merely a matter of powerful tackle and a few simple car replacing appliances properly used. Any attempt to replace any engine of any of the latter classes, one pair of wheels at a time, can only result in injury more or less serious, according o the build of the engine,

Wright's Steam Economizer for Compound Locomotives.

This device consists of two safety-valves placed one on the barrel of the boiler, back of the smoke stack, and the other on the smoke arch and connected to the receiver, which, in Mr. Wright's engine, is formed by a space between the inner and outer sheets of the smoke box, which is made double for the purpose of forming a receiver between the high and low-pressure cylinders. The safety-valve on the receiver prevents the pressure accumulating above a desired point. By it the excess of steam pressure is discharged into the atmosphere.

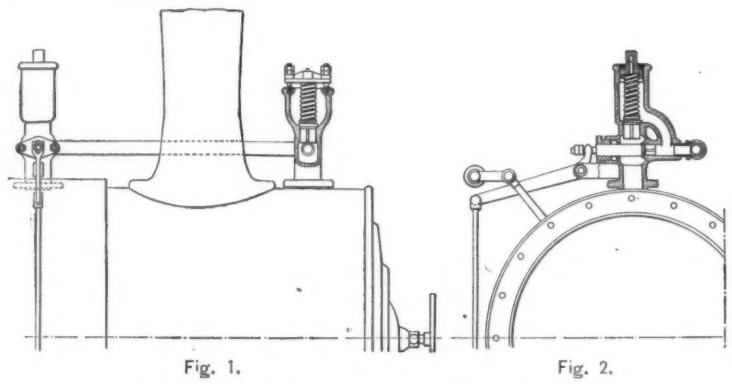


Fig. 1. Fig. 2.

Wright's Steam Economizer for Compound Locomotives.

The safety-valve on the barrel of the boiler is connected in such a way that, when it opens, the excess pressure, instead of being discharged into the atmosphere, as usual, is conveyed to the receiver by means of the pipe connecting the two valves, as shown. In starting the engine, steam is admitted to the receiver by means of the small valve below the safety-valve on the shell of the boiler, which is opened by means of levers and rods reaching to the cab.

The object of this device is to prevent waste of steam by blowing off at the safety-valve when the engine is working and has more steam than is needed for the engine. It is also intended to be useful when the engine is running light and blowing off, by furnishing steam to the valves of the low pressure cylinders to lubricate them.

An Indian Route Table.

We give below specimen extracts from a complete and ingenious "Route Table of Indian Railways," compiled by Mr. Neville Priestley, District Traffic Superintendent, Bombay, Baroda & Central India Railway. The chart shows the routes and distances between junction points, which are 107 in number. The figures given indicate the distances in miles and the letters refer to the "Route Index," of which we print only a small part. To provide for such stations as are not given in the chart, an alphabetical list is given showing all stations, and the route and distance from each to one or more of the junction points, so that it is an easy matter to determine the shortest route between any two stations, however remote or unimportant.

Suppose it is desired to find the distance and the route from Arkouam to Ajmere, we should run down the column under Ajmere to the line of Arkouam, and find that the distance is 1,314 miles. By reference to the Index for Routes we find that the characters E. u. f. indicate that the route is via the Madras Railway to Dhoud and Maumar, and via the G. I. P. Railway to Khandwa, and thence via the B. B. & C. I. Railway to Ajmere. But if we wish to know the distance and route between two stations not given in the chart, we must refer to the supplementary list, of which a selected extract is given as follows:

Alphabetical list of railway stations in India, showing distance from each to the adjacent junction on each side of it.

Railway on which station is situated.	Code abbreviation of name of station.	Name of station.	Names of adjacent junctions on either side of the station, and the distance of the latter from the former.			
			Adjacent junction on one side of station.		Adjacent junct'n on other side of station.	
			Name of junction.	Distance to station.	Name of junction.	Distance to station.
B. N.....	A D A.	Adra	Assensol...	24	.....	....
B.B.& C.I.	A G S.	Agas ..	Anaud.....	8	.....	....
B. B. & C. I. & I.M.	A G C..	Agra Cantonment...	Achuera....	15	Agra Fort...	2
B.B.& C.I.	A I	Akhri...	Ajmere.....	12	Phulera.....	38
B.B.& C.I.	A B D.	Ambli Road..	Ahm'dabah	11	.....	....
M.....	A B....	Ambur..	Arkonam ..	71	Jelarpet.....	19

Thus, to find the shortest route from Adra to Agas we ascertain the distance from Adra to Assensol, the nearest junction in the proper direction, to be 24 miles; likewise from Agas to Anased is eight miles; the railway lines in both cases being given. Now, we refer to the chart for the route from Assensol to Anand, which we find to be 1,288 miles, via the E. I. Ry., Tundla, Agra and the B. B. & C. I. Ry. The entire distance then is 1,320 miles and the route as follows: Adra to Assensol via B. N. Ry., to Tundla and Agra via E. I. Ry., to Anand and thence to Agas via the B. B. & C. I. Ry.

The following is a specimen of the *Route Table* much reduced in the size of type, etc.:

ACHNERA.....	ACHNERA.															
AGRA FORT...	B 16	AGRA FORT.														
AHMEDABAD	B 522	B 538	AHMEDABAD.													
AJMERE.....	B 218	B 234	B 305	AJMERE.												
ALIGARH.....	Y 71	D 63	Y 503	Y 288	ALIGARH.											
ALLAHABAD (Niani).	w 298	D 282	w 820	w 515	D 316	ALLAHABAD (Niani).										
AMRITSAR....	Yy 427	y 419	Ty 858	Ty 553	y 357	y 672	AMRITSAR.									
	rY 440	r 432	Tr 897	Tr 592	r 370	r 685										
ANAND.....	B 562	B 578	B 40	B 345	y 633	w 860	Ty 898	ANANDA.								
							Tr 937		ARKONAM.							
ARKONAM....	EUZL 1419	EUZ 1405	ES 1048	EUf 1314	EUZx 1468	aUE 1408	EZxy 1824	ES 1008								
				ES 1352			yTfU 1866									
ASSENSOL....	w 726	D 710	w 1248	w 943	D 744	D 428	Oz 1088 y 1100	w 1288	EUa 1836	ASSENSOL.						

The following is a specimen of the "Index for Routes":

Capital Letters.

Index letter.	Name of junction, railway or route that the letter stands for.
B	Bombay Baroda and Central India Ry. (B. B. & C. I. R.)
D	East Indian Railway (E. I. R.).
E	Madras Railway (M. R.).
L	I. M. Ry., Agra, and the B. B. & C. I. Ry.
S	B. B. & C. I. Ry., Dadar, and the G. I. P. Ry.
T	Delhi and the B. B. & C. I. Ry.
U	Dhond, Manmar and the G. I. P. Ry.
Y	E. I. Ry., Hattras Junction, and the B. B. & C. I. Ry.
Z	G. I. P. Ry., Itarsi, and the I. M. Ry.

Small Letters.

Index letter.	Name of junction, railway or route that the letter stands for.
a	G. I. P. Ry., Japalpore, and the E. I. Ry.
f	G. I. P. Ry., Khandwar, and the B. B. & C. I. Ry.
r	E. I. Ry., Ghaziabad, and the N. W. Ry.
w	E. I. Ry., Tundla, Agra, and the B. B. & C. I. Ry.
x	E. I. Ry., Tundla, Jhansi, and the I. M. Ry.
y	Umballa, Delhi, and the E. I. Ry.
z	O. & R. Ry., Saharanpore, and the N. W. Ry.

It is probable that in this country the great number of stations would make such a classification as this too cumbersome for convenient use, but we recommend the plan to some enterprising passenger agent as an excellent method of showing that his line is at least a part of the shortest route between any and all points.

The Staying of Locomotive Fireboxes.

BY ARTHUR T. WOODS.

In view of the general adoption of higher steam pressures for locomotives than were customary a few years ago, and the more extensive substitution of radial stays and Belpaire fireboxes in place of crownbars and their accessories, a brief consideration of the proportions of stays and stayed surfaces may not be uninteresting. In regard to screwed stays, a series of experiments made about 12 years ago by a board of naval engineers * probably furnishes the most valuable experimental data obtainable, particularly as the proportions adopted by the board are more nearly in accord with present practice than with that of the period in which they were made. In these experiments a preliminary test established the

* Report of Secretary of the Navy, Executive Documents, 2d Sess., 46th Congress, Vol. 8.

fact that when the riveted heads of screwed stays were found with a button-head set to spherical segments the structure was from 23 to 36 per cent. stronger than with the low conical heads. The subsequent tests were confined to screwed stays with button-heads and to those fitted with nuts, but included iron plates and iron bolts, Otis steel plates and iron bolts, Otis steel plates and Otis steel bolts and copper plates and iron bolts. Of the formulas recommended by the board the following are the most directly applicable to the present methods of staying locomotive fireboxes:

For iron plates and iron screwed stays with button-heads,

$$d^2 = \frac{24000t^2}{p} \qquad (1)$$

For steel plates and iron screwed stays with button-heads,

$$d^2 = \frac{25000t^2}{p} \qquad (2)$$

For steel plates and steel screwed stays with button-heads,

$$d^2 = \frac{28000t^2}{p} \qquad (3)$$

For iron plates and iron screwed stays with nuts,

$$d^2 = \frac{40000t^2}{p} \qquad (4)$$

In these formulas d = the distance between centres of stays in inches, t = the thickness of plate in inches, and p = the working gauge pressure in pounds per square inch. The diameters recommended for bolts are, outside of threads, 1 in. for ¼-in. plates, 1⅛ in. for ⅜-in. plates, 1¼ in. for ½-in. plates, and 1⅜-in. for ⅝-in. plates. In all cases a length equal to half the diameter of the bolt is to be left through for riveting. The following table exhibits values for the pitch (d) determined by formulas (2), (3) and (4) for various pressures and thicknesses of plates:

PITCH OF SCREWED STAYS.

Gauge pressure.	(2) Steel plates, iron bolts.			(3) Steel plates, steel bolts.			(4) Iron plates, iron bolts with nuts.		
	5/16	3/8	1/2	5/16	3/8	1/2	3/8	1/2	5/8
140	4.18	5.01	6.68	4.42	5.30	7.04	6.34	8.45	9.50
150	4.03	4.84	6.45	4.27	5.12	6.83	6.12	8.17	9.19
160	3.91	4.69	6.25	4.13	4.95	6.61	5.93	7.91	8.90
170	3.79	4.55	6.06	4.01	4.81	6.42	5.75	7.67	8.63
180	3.68	4.42	5 89	3.90	4.68	6.24	5.59	7.45	9 38
190	3.58	4.30	5.74	3.79	4.55	6.07	5.44	7.25	8.16
200	3.49	4.19	5.60	3.79	4.44	5.92	5.30	7.07	7.93
⅞	5,240	7,550	13,420	5,870	8,460	15,030	12,080		
1	3,920	5,650	10,050	4,400	6,320	11,250	9,040	16.080	
1⅛			7,960			8,910	7,160	12,730	16,13C
1¼			6,120			6,860	5,510	9,790	12,300
	5,556			6,222			8,889		

In the lower portion of the table is given the approximate tensile stress on bolts of diameters from ⅞ in. to 1¼ in., when used with the pitches given in the same vertical columns, calculated for the *net* area of the bolts, assuming 12 threads per inch. In the last line of the table the greatest stress in the plates is given as calculated from Grashof's formula,

$$f = \frac{2}{9}\frac{d^2}{t^2}p, \qquad (5)$$

for stresses below the elastic limit of the material; in which f = the stress in the plate, and the other letters have the same signification as before. Comparing formula (5) with the preceding formulas it will be seen that all have the same general form, or, in other words, the formulas deduced from the experiments are really based upon the stress in the plates.

An examination of this table shows, for example, that if a pitch of 4 in. is used for 5/16-in. steel plates with iron bolts and a pressure of 150 lbs., to use 180 lbs. and make the structure equally strong the pitch should be reduced to about 3.7 in.; but if ⅜-in plates are substituted for 5/16-in., 180 lbs. can be carried, with the same margin for safety, with a pitch of about 4.4 in. If 1-in. bolts are used, the tensile stress per square inch of net area will be about 3,920 lbs. with 5/16-in plates and 5,650 lbs. with ⅜-in. plates. In either case the maximum stress in the plate will be about 5,556 lbs. The table may thus be useful for comparisons without necessarily adopting the factor of safety used in the formulas from which it was constructed There are necessarily many cases in practice in which it is impossible to exactly follow any rule for proportions, as, for example, in staying the outer side sheets of Belpaire fireboxes above the crown sheet, in which case it may be necessary to place the stays closer together than the proper support of the side sheets requires in order to get them between the vertical crownsheet stays. But a comparison of the values in the table with the proportions to be found in some designs of fireboxes will reveal some notable inconsistencies.

The stress in flat stayed plates varies, as shown by (5), directly as the area supported or as the square of the pitch, and inversely as the square of the thickness of the plates. In other words, if, for a given plate and pressure, the pitch be increased from 4 in. to 4.5 in., the stress in the plate will be increased in the proportion of $(4.5)^2$ to $(4)^2$ or about 26.5 per cent.; or with the same pressure and pitch the stress in 5/16-in. and ⅜-in. plates will be in the proportion of $(\frac{3}{8})^2$ to $(\frac{5}{16})^2$ or of 36 to 25. It follows that if the pitch used with 5/16-in. plates is 4 in., as, for example, in the side sheets of a firebox, the pitch for a ⅜-in. crownsheet should be 4.8 in., and for a ½-in. side sheet 6.4 in., to give the same strength in all of the plates. It appears to be a common practice to use a larger factor of safety for crownsheet stays than for water-space stays. When the factor of safety used in the first instance is not large this would seem to be entirely correct, but the advisability of using, as is some times done, a factor of safety of about 5 for the cylindrical shell, 10 for the water legs, 10.5 for the crown sheet, and 11.25 for the outer side sheets in a Belpaire firebox is not evident. There is a limit beyond which the gain in safety by the closer spacing of stays is more apparent than real. For instance, we find the ⅜-in. crown sheet of a Belpaire firebox stayed with screwed and riveted stays 13/16 in. net diameter, spaced about 4½ × 4¼ in., there being 10 rows of 25 stays each. If these stays had been spaced about 4.7 in. apart, nine rows of 22 stays each would have been sufficient, and the increased distance between these stays would allow the number used for the outer side sheets to be reduced. In all, 58 stays less would be required. The maximum stress in the crown sheet with the working pressure of 160 lbs. would be about 5,580 lbs., and the tension of the stays about 5,120 lbs. per square inch of net area. If one stay bolt should break the stress in the plate would be four times that given, or about 22,320 lbs., which is within the elastic limit for steel plates. The load on the adjacent stays would be increased, of course, but not to a dangerous extent. With the pitches actually used in this boiler, the plate stress, in case of the fracture of one bolt, would be about 17,840 lbs.

What has been said with reference to the spacing of stays in Belpaire fireboxes, is applicable as well to radial stays and crownbar bolts. The tension of radial stays is, of course, increased when they are inclined to the plate which they support, but this increase is ordinarily of small moment, when, as is usual, the total tension on the bolt does not exceed 5,000 or 6,000 lbs. per square inch of nominal area. Formulas (1) to (5) are strictly applicable only when the stays are arranged in squares, but may be used without serious error when the stays are arranged in rectangles, if the difference in the pitches in the two directions is not great. In using formula (5) in such cases d should be taken as the longer side of the rectangle.

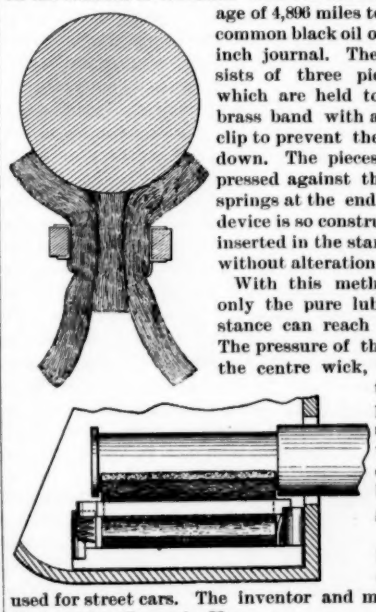
In the Belpaire form of firebox the distribution of the loads, when the boiler is hot and under pressure, can be predetermined, as has been shown, with a reasonable degree of accuracy. But in the wagon-top form, particularly when crownbars are used, which are connected by stays to the cylindrical shell of the wagon-top, an attempt to calculate the distribution of the loads involves considerable guesswork. The primary cause of difficulty is the unequal expansion of the inside and outside shells of the firebox, due to their difference in temperature. The inside sheets, having fire on one side and water on the other, are undoubtedly hotter than the outside sheets, which are exposed to the air. As both plates are rigidly attached to the mud ring, it is fair to conclude that the greater expansion of the inside sheets, due to the higher temperature, takes place upward. As we do not know the temperature of the plates, we cannot estimate the amount of this expansion, but supposing that the inner sheet expands ⅛ in. more verticallly than the outer sheet, the ends of the crownbars which rest on the inner sheets will be lifted that much. It seems reasonable to suppose that the sequence of events is then something like the following: The ⅛-in. rise of the ends of the crownbars will be enough to relieve the says which connect the crownbars and cylindrical sheel from tension. The crownbars themselves are not strong enough to support the pressure on the crown sheet without bending, and hence they bend and the crown is deflected, possibly enough to bring the stays into action again, and any further deflection will be very small. If the crown sheet was originally flat, the effect of this sagging is to increase the tension of the top row of screwed stays in the side sheets by pulling the latter closer together. If the crown was originally arched, it is of course flattened by deflection and the tendency is to spread the side sheets. If the sides of the wagon-top are tied together by horizontal stays above the crownsheets, some additional load may therefore be thrown on these stays by the expansion of the inner shell of the fire-box. If it were assumed that the stays connecting the crownbars to the cylindrical shell were fitted tight, without slack, when cold, the expansion of the inner shell with heat would bring a compressive load on these stays, which, reacting on the crownbars, might deflect them downwards. These statements are, of course, hypothetical and simply show, as has been already stated, that we cannot accurately predetermine the loads which may come on the various members in this system of bracing fireboxes.

Upon the assumption that the stays connecting the crownbars to the cylindrical shell are taking their share of the load, we may make an approximate calculation of he loads as shown in the following example, in which the dimensions are approximately those to be found in a recent boiler: Straight crownbars, 56 in. long, 5⅛ in. deep, each half bar ¾-in. wide; distance between centres of bars, 4 5/16 in.; 12 bolts to each bar, the pitch being about 4⅛ in.; two crownbar stays to each bar, each pinned to bars 8¼ in. from centre line of boiler; net area of each stay through pin holes, 1⅛ sq. in. If each stay supports all the load which may come upon it, each crownbar is really a continuous beam supported at the ends and having two intermediate supports. The middle section, between the stays, may be considered, without serious error, as a beam fixed at both ends and uniformly loaded, and the maximum stress may be determined on that basis by the usual well-known formula. The end sections may be considered as beams fixed at one end, supported at the other, and uniformly loaded. By this method we find that the maximum stress in the middle section to be about 2,330 lbs. and that in the end sections about 5,000 lbs. The load upon each crownbar bolt is about 3,200 lbs., and there are 4 bolts between the crownbar says and 4 between each stay and the nearest end of the bar. Treating each stay as a support, the load upon it is then about 3,200 × 4 = 12,800 lbs., and that upon the side sheets at the end of each double bar is about 3,200 × 2 = 6,400 lbs. As the area of each stay is 1⅛ square inch the tension per square inch is about 11,378 lbs., and the factor of safety is about 4.5. The above is only an approximate calculation, but it serves to show the maximum probable load on each part under the assumed conditions. If the crown bar stays are not carefully fitted, they may not support the bars, as has been already explained, and the latter may have to bear the whole of the load on the crown sheet. In the case taken for illustration, the stress in the crownbars would then be over 40,000 lbs. per square inch, the bars would bend and would remain bent until the firebox cooled down, when the contraction of the parts would straighten them again. When radial stays are used, the expansion of the inner shell of the firebox introduces unknown loads, but the whole structure is much more flexible than with crownbars.

The bending due to alternate heating and cooling has been advanced as an explanation of the observed tendency of the upper rows of screwed stay bolts to break. This explanation is perfectly reasonable, and in accordance with experience and experiments,* and short screwed stays, on account of the sharp indentations of the threads, offer excellent opportunities for the beginning of cracks. The remedy would seem to be to make the bolts more flexible by leaving the middle parts of the bolts without threads and of smaller diameter than the threaded ends, as is done in radial and other long screwed stays, and by increasing the length of the bolts as much as possible. If the Belpaire fire-box is a remedy for this difficulty, as is claimed, its superiority is probably due to the greater freedom to expand which this form possesses over the wagon top form. No deflection of the crown sheet on account of changes of temperature is possible in the Belpaire fire-box, since when the inner shell expands and raises the crown sheet, the flat outside top sheet will yield correspondingly, while on the other hand, the cylindrical shell of the wagon-top is already in its strongest shape.

Sumpter's Car Journal Oiler.

The novel car journal oiler shown has been tried on the Norfolk & Western. The results showed a mileage of 4,896 miles to one pint of common black oil on a 3½ × 7½-inch journal. The device consists of three pieces of felt, which are held together by a brass band with a small sheet clip to prevent the felt falling down. The pieces of felt are pressed against the journal by springs at the end. The whole device is so constructed as to be inserted in the standard oil box without alteration of that box.



With this method of oiling only the pure lubricating substance can reach the journal. The pressure of the journal on the centre wick, which wipes the journal, prevents the side wicks, which are the oilers, from becoming gummed.

This device has been quite largely used for street cars. The inventor and maker is Mr. J. U. Sumpter, Carnegie, Va.

The Chesapeake & Ohio Canal.

The work of repairing the Chesapeake & Ohio Canal is being rapidly pushed forward. It is expected to have the canal restored as far as Williamsport by May 15, and with good weather the entire route will be completed by July 1. The work of repairing boats has also been begun.

* See paper by Mr. L. S. Randolph, Vol. IX. A. S. M. E Transactions.

RAILROAD GAZETTE

Published Every Friday,
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

We call especial attention to the reports in this issue to the discussions of the New England and the Central clubs on air brakes in freight service. These are directed particularly toward such changes in the Rules of Interchange, as will insure fairly good condition of the brakes and brake gear. It is unnecessary for us to add anything in this column to what is to be found in the reports of the proceedings of those clubs. We have spoken many times in the last two years of the common carelessness in the maintenance of brakes in passenger service. What is carelessness in passenger service is no doubt magnified into gross neglect in freight service, and the time has come when the freight train air brake must be recognized in the Rules of Interchange. The time has come also when most companies must, for their individual needs, have more systematic inspection of, and instruction in, the use of air brakes. No doubt some modifications of the Rules of Interchange providing for the inspection and care of air brakes on interchanged cars will be presented to the Master Car Builders' Association. These, we suppose, will require the inspector to reject a car, not only when the air brake is defective in any of its parts and operations, but when the triple valve and cylinder have not been cleaned and oiled within a specified time. Roads will be responsible for cleaning and oiling air brakes on foreign cars while on their lines. Repairs will be treated like repairs on other parts and appendages of freight cars. Something like this, we judge, will be presented by the committee for the consideration of the Associations. Recommendations for inspection and testing at interchange points will also doubtless be made. We should suppose that the simplest arrangement for testing at most points, or at least the one that could be most quickly put in operation, would be to equip all switching engines with brake apparatus. At any rate, these are matters that the responsible officers must take under careful consideration at once, and on which they ought to be prepared to take definite action at the next convention. The resolution of the New England Club recommending that an air brake instruction car be owned jointly by the Boston roads is a sensible one, and indicates an easy way out of a costly business. We suggest that people who are ready to take hold of this matter in earnest will find some useful hints in Mr. Wall's account of his air brake instruction train in the *Railroad Gazette* of March 27.

"The violation of a train rule should be deemed an infraction of the law," and the guilty person tried by a court and jury, if his misconduct has caused death and disaster. This was one of the points of Colonel Haines' address at the Time Convention last week. And it is a good point, though the speaker, in spite of the eminently fair and just tone of his remarks as a whole, and his reputation as a considerate employer, will very likely be characterized by the "labor" advocates as a tyrant for uttering such views. Speaking generally, the practical difficulty is not, however, in securing the enactment of laws for punishing a negligent switchman, or engineman; for many States—perhaps all of them—have such statutes already; but in enforcing them. It has been shown by long experience that district attorneys and other public prosecutors will not act with zeal in such cases. No doubt they could give some good reasons for their attitude in the matter, but the actual fact is, that the punishment must be secured, if at all, by the efforts of railroad officers themselves. But as long as juries are swayed by human sympathies instead of by rigid principles of law, a successful prosecution can be made only by a perfectly unprejudiced prosecutor, for that is essential to the presentation of a strong case. A superintendent can get out a telling indictment, even while he lives in a house made entirely of glass, but there is little use in trying to use it until he has rebuilt his structure in some material that will withstand the stones thrown back by the employé's counsel.

The lawyers can recall numerous instances tending to prove the above. Engineer Twombley was let off at Chicago a year ago, in spite of the fact that he was admittedly under the influence of liquor when he ran past a red signal and into a carload of passengers; but who can doubt that the jury was largely influenced by the fact that he had been re-employed by an officer of the company after he was known to be a drunkard? A brakeman in Pennsylvania not long ago was suddenly transferred from the front to the rear of his train, and it there became his duty to flag a following train; but he failed, a collision occurred, and he was arrested. He got clear, however, on showing that he had never received a book of rules. However good his training may have been, the evidence that the trainmaster did not follow his own regulations tended to show lax discipline, and weakened the case so that it fell through. Instances like these afford powerful proof of the correctness of Colonel Haines' other assertion, which has often been emphasized in these columns, that the employer must unmistakably find out beforehand just how capable his employés are. It is not necessary for a superintendent to be perfect in order to properly punish his subordinates, but it *is* necessary for him to show a consistent endeavor to do his part thoroughly well, if he is going to ask a jury to assist him in applying penalties. And as long as he is supposed to have greater resources and intelligence than his brakemen, he will find it difficult to get sympathy from the public if juries ask him to do *more* than his part.

Another law which is all right on the books but fails in application is that excluding pedestrians from railroad tracks and grounds. It will be remembered that the Massachusetts commissioners, in their last annual report, discussed this subject at length and went so far as to suggest that if people *must* walk along railroads, the towns ought to construct paths and fence them off. A modification of the law as it affects entering upon a railroad at a crossing was proposed and has been brought up in the Legislature, but that body has rejected it, evidently holding that not more law but more enforcement is what is needed. Here, as in the case of reckless trainmen, railroad officers must fight almost single handed. In New York State the local magistrates are elected by popular vote, and are very cautious about doing anything to antagonize voters. Even if a railroad company brings up clear cases by the dozens, the sentences amount to nothing. In Massachusetts the magistrates are not elected, but are appointed; but there is no co-operation and no enforcement of the law unless the railroad companies catch the trespassers at great expense and some risk—risk of train wrecks perpetrated in revenge. The Boston & Albany has just suffered from a crime of this sort as atrocious as any ever committed in the wilds of Mexico. Train wreckers act from various motives, but there seems no way of crushing the evil except by a general repression of ordinary trespassers—persons supposed to be harmless; and as long as revenge is one of the motives that are found to actuate wreckers, it is for the public interest that the municipalities take the lead in the police regulation of railroad rights of way. The public is the sufferer, and in the end has to pay the losses.

This wreck on the Boston & Albany (express train No. 9, near Westfield, on the night of April 6) was somewhat remarkable. The train was heavy, was going about 40 miles an hour and the night was very dark, so that the engineman saw the obstruction (sleepers) only when he was within about 200 ft. of it. The engine and first three cars—two mail and one express—were derailed and overturned down a bank some 20 ft. high, but only the engineman, express messenger and one brakeman were seriously injured, and they are doing well. The notable circumstances are those connected with the bridge floor, the steam heating and the quick-acting brake. The derailed engine and cars went safely over a 40-ft. bridge before tipping over, the obstruction being only about 40 ft. from the bridge. The ties on the bridge were 10 × 10 in., spaced 5 in. in the clear, and the guard timbers were 12 × 12 in., notched to each tie and bolted to every third tie. The floor remained intact, and the guard timber, which was rubbed by the wheels only for about 10 ft. at the further end, kept the cars from damaging the truss. The express car was badly broken up, so that a fire in it would almost certainly have ignited the wreck. There is nothing in the reports about any alarming discharge of steam from broken pipes, such as has lately occurred in some railroad officers' imaginations. The absence of stoves in all the wrecked cars is the more notable in view of the fact that some roads which have put continuous heating apparatus on passenger cars have omitted to put radiators in baggage and mail cars. Finally, the superiority of the quick-acting brake over the ordinary automatic doubtless materially shortened the distance required to check the speed, the heaviest cars being at the rear of the train. By having these three first-class "safety appliances," the road gets off with a moderate loss, while the absence of any one of them would very likely have resulted in several deaths. The obstruction was placed where the view is by no means short, and the half-dozen Western roads that use the electric headlight would probably tell the Boston & Albany that the wreck was a preventable one; and the loss from it is probably equal to the cost of 30 or 40 headlights. One of the Ohio roads is so well pleased with this light that several freight engines have been equipped with it, and it is used with satisfaction on double as well as on single track.

The local papers reported this wreck very thoroughly and the foregoing notes do not exhaust the lessons to to be learned from the disaster. Some railroad commissioner has lately advised yardmen to wear gaiters rather than buttoned or tied shoes; the engineman of this train will now enthusiastically indorse that view, as he says that if he had not had on the elastic style of shoe, he could not have extricated his foot from the position where it was being burned by contact with the fire box. The mail clerks say that they were compelled to break a hole in the windows of their car very quickly in order to avoid suffocation by gas, with which the car became filled from a ruptured pipe. This suggests that possibly some express and baggage cars, in which lights are used, might profitably be fitted with more or larger windows. A passenger in the smoking car had for hand-baggage 25 lbs. of dynamite. His feelings when the wheels began to bump on the ties can better be imagined than described. Even after the car stopped he feared the concussion of a possible boiler explosion, and hastily made for the woods with his dangerous luggage. Here, again, is a piece of lawlessness which railroads are constantly liable to suffer from, but which they can do nothing to suppress, unless the public authorities take the initiative.

The Boycott on the Chicago & Alton.

The Alton fight involves three quite distinct questions: *First*, whether the connecting roads have the right to refuse to sell or honor Alton tickets; *second*, whether they have the right to enter into a combination for that purpose, in order to compel the adoption of a particular line of policy which they favor; *third*, whether, irrespective of legal right, they are likely to succeed in so doing.

To the first question, we should say yes, without hesitation; to the second, we should give the same answer; to the third, we should say no.

The first question was decided by the Interstate Commerce Commission in July, 1887, in the case of the Chicago & Alton against the Pennsylvania company: "In the absence of statutory authority, one railroad company can sell tickets and check baggage over the road of another company only by agreement; and the Act to Regulate Commerce does not in terms require one railroad to sell through tickes over the roads of another company. Railroad companies may, under the right to control the official conduct of their own agents, forbid their agents to receive commissions from other companies for the sale of tickets over such other companies' roads, and may direct them not to sell tickets over roads of companies which refuse to recognize this corporate authority, but which insist on subsidizing such agents." Again, nearly two years later, in the case of Little Rock & Memphis against East Tennessee, Virginia & Georgia, it was held that there was no enforceable right to have a through rate established, even when the public interest, in a general way, might seem to demand it.

Mr. Morrison dissented from the opinion of the Commission in the former case, and, by implication, in the

latter also. His idea was that if the public wanted to travel by the Alton, it had a right to have tickets sold over the Alton; and that the connecting roads had no right to discriminate against the Alton on account of any practice which that road might adopt that was not distinctly illegal. Apart from the question whether there exists any such wide public right as Mr. Morrison assumes, he seems to have given less than due weight to the fact that the practice of paying commissions almost necessarily involved the selling roads in violations of the law, and that their right to protect themselves against such violations on the part of their agents ought to be construed broadly rather than narrowly. We cannot imagine that Mr. Morrison's view of the matter would be sustained by the courts, nor do we believe that the Chicago & Alton people themselves expect it.

But may it not be illegal for a number of roads to do all at once by joint action what they have the right to do separately? This is the position taken by the legal department of the Alton. Mr. William Brown, its general solicitor, writes as follows:

"I would respectfully advise you that, in my opinion, a number of railway companies have no legal right to combine together and take concerted action to interrupt the business of this company as a penalty of your refusal to enter into any contract with them. Such a combination amounts in law to a conspiracy, and the participants are responsible for any injury which may result therefrom to the business of this company. This action can have no reasonable justification in the well-established right of any individual company to regulate and control the sale of its tickets. Your refusal to decline the payment of commissions might, under some decisions, justify a particular company in prohibiting its agents from handling your tickets because of the pretext that payment of commissions might, in some imaginary way, interfere with the duties of the agent to his principal; but it is not readily understood how the pursuance of the now usual custom of railroads to sell through tickets and check baggage through can in any respect impair the rights or be detrimental to the railroad which is thus favored with custom." And General Passenger Agent Charlton notifies the connecting roads that they will be held responsible for any damage which may result to the Alton company by reason of the proposed boycott.

This is not so forcible as it sounds. It is quite true that the law recognizes that a great many social arrangements are founded on the principle that individuals will act as individuals, and that the concerted refusal of a number of people to deal with a certain company may be wrong, when a refusal on the part of each of them individually would be right. But this is not that kind of a social arrangement. On the contrary, it is a case where the various companies under normal conditions will act collectively. Making through rates is not a thing which each individual road will settle for itself, or ought to settle for itself. It is in the interest of the public as well as of the railroads that there should be joint action. So far from creating a presumption of conspiracy, such joint action in the matter of passenger business creates a presumption that the roads are acting properly, for the simple reason that they cannot act properly without it. And when the Alton company protests against such action, in opposition to a practice of its own which the Interstate Commerce Commission has repeatedly pronounced to be "neither reasonable nor proper," it has no moral case at all, and, we imagine, no legal one.

The real trouble is that the alleged conspiracy against the Alton is not strong enough. The Alton's strength lies in the fact that the action of the connecting roads does not seem likely to be quite universal. Some roads will probably continue to handle Alton business, which will probably be an element of moral weakness to the Trunk lines, and certainly an element of practical weakness. It is useless to deny that the old fight on the same ground resulted in favor of the Alton. It may be open to dispute which side had the heaviest losses; but there can be no question at all that at the close of the fight the Alton was in possession of the field. This bit of past experience makes the Alton considerably stronger than it would be otherwise.

Surveys for the Inter-Continental Railroad.

Public attention is now called to the fact that two expeditions are being sent out by this government to survey routes in Central and South America for the proposed inter-continental system of railroads. One of these, under Chief Engineer W. F. Shunk, will proceed to Quito, Ecuador, where the party will separate, one division going northward through Colombia, the other southward through Peru.

Although we may not expect the scheme of a great Pan-American trunk line to be realized through a *coup de main* of the republics interested, but to come instead by degrees, from the linking together of many separate lines as the needs of commerce call them into existence, the labors of this commission should, nevertheless, yield results of great importance. The region from Popayan, Colombia, to Ibarra, Ecuador, is very imperfectly known. Even Humboldt expended but little energy upon it, and the feasibility of railroad construction through those rugged valleys is at present merely conjectural. Furthermore, the resources of the region are practically unknown.

Regarding the conditions northward of Popayan, there is already ample knowledge, but the surveying party can bring us much new and valuable information of the district between Ibarra and the headwaters of the Rios Cauca and Magdalena.

Even more important is the fact that competent engineers are to traverse the great interior valley of Northern Peru. The "brief, conclusive M. de la Condamine" was all too brief in his description of this region. There was no commerce then in Eastern Peru; no thought of highways from the Amazonian basin to the Pacific. The chief interest of the distinguished astronomer was consequently to determine the latitude and longitude of the more important points, and to enjoy the novelty of his first experience in canoes on the boisterous upper Amazon. Now, however, the little town of Jaen is attracting attention. It may become an important railroad centre. The altitude of the valley in which it stands gives reason to believe that it may prove adapted to the cultivation of cereals. Legend has long endowed it with mineral wealth. The Payta & Piura railroad was originally intended to traverse this valley and connect the navigable water on the Amazon at the Pongo, or cataract, of Manseriche, and the route was declared practicable. But the valley remains veiled in many obscurities, which will now be cleared away if the work of this company is thoroughly done.

The second expedition, under Captain Edgar Z. Steever, U. S. A., will survey a route through the Central American States to the Nicaragua Canal, and a third expedition to Colombia and Venezuela is contemplated, which may be dispatched later in the spring.

Although the projected Intercontinental Railroad will appear to the majority of Americans as a Utopian dream, expeditions of this kind should meet with approval and sympathy. They will increase our knowledge of South America, and bring us into closer relations with its people. In spite of the uncertainty of political institutions in Spanish America, her demands for the manufactures and the products of temperate climes will continue, and must be supplied. To secure this trade is an important problem for Americans, and the information brought back by exploring expeditions should have the widest possible circulation, by which means they may contribute in the end to the linking of the three Americas by bands of iron.

Some Considerations of Electric Motors for Railroad Use.

The use of electricity as a transmitter of power does not simplify the problem of the application of heat as a mode of motion to trains. To the contrary, it introduces an additional mechanism that has all the individual elements of the steam locomotive. Take the two systems as they are when complete, the steam locomotive and the stationary steam plant, with its electrical conductors reaching to the train, and one finds electrical systems to be the more complicated and to have the greater number of parts that require maintenance. The main reasons for the popularity of electric transmission are cleanliness and the simplicity of the machinery on the train. No one has ever yet been able to prove it to be, in general, more economical to use electricity, except where the conditions are such as to render possible by its use the removal of some unusual expense, not common to the average conditions of operation of steam railroads.

The difference between the estimates of the advocates and opponents of the use of electricity is too great to give the layman confidence in either. On the one hand we are told that a saving of 25 per cent. is easy by its use, and on the other we are directed to trials which show a loss of 70 per cent. What leads the public to a conclusion favorable to the electric current, is the fact that power in the form of an unknown molecular or atomic wave, called electricity, and having about it a little mystery, can be turned loose in a wire that can be bent in a myriad of directions, and from which the power can be collected at any point of its length.

All of the former doubts as to the loss of power on the line conductors are settled beyond all doubt; it is the motor that now embodies most of the problems which throw a cloud of uncertainty over the subject.

Economy is, of course, a prime requisite in a motor of any sort for railroad use; and however simple a motor may be, or whatever may be its maximum power, it will not be extensively used if it is not economical. It is a mistake to think that the present type of steam locomotive is not a comparatively economical machine, for there is no other system of propulsion that can approach it in economy, with an equal price for fuel and under the conditions of surface railroad service. Yearly the electric current as a transmitter of power to trains from highly economical central stations, creeps up the scale of economy and crowds on the heels of the steam locomotive, but the steam motor is also being made more economical by improved boilers and compounding. Hence it is bound to be a "stern chase," and a long one, before the electric system, as a whole, reaches the same economy as a transmitter of power to moving trains from central power stations, as has already been reached by the moving steam plant in the form of a locomotive which applies the power directly to the train.

As has just been stated, the difficulty in the path of development of the electric system is not in the loss during the transmission from central station to motor. If it were, then the trouble would be readily removed by the use of larger conductors, and the commercial efficiency would be largely dependent upon the price of copper. The stationary engine is easily so operated as to give 1 horse power of useful work for 2 lbs. of coal, and, in large plants, at a wonderfully low cost for labor. The dynamo of to-day will turn this into an electric current with an efficiency of 90 per cent. The loss on the lines of transmission need be but small. The resistance may be kept so low as to reduce the total efficiency but five per cent., at the most, from this cause. The leakage on a well-laid line is surprisingly small. On the West End street railroad, of Boston, the leakage is so small as to be of little moment in considering the economy. Hence, the current representing the useful work of the steam engine is readily delivered at the motor of a train at an efficiency of 85 per cent. without requiring extraordinary engineering or a large expenditure for plant.

The loss in electric systems of propulsion lies in the motor, and for convenience we may divide the motor into two parts and roughly analyze the causes of loss. The motor is made up of two important parts, the electrical and the mechanical. Strictly, both are mechanical; but there is sufficient distinction, at the present stage of development, to permit us to speak of the electrical part and the mechanical part of an electric locomotive. The electrical part is simply a plain, every-day dynamo, with which all are familiar. The difference is that the motor receives current and is made to revolve by it, while the dynamo is driven by an external force, such as a steam engine, and gives off current. The motor would give off current if it were driven by an engine just as the dynamo does. In fact, it does tend to give off current, when driven by a current. This is the counter current, and plays a very important part in the efficiency of the motor, as will appear later. It reduces the main current, and the faster the motor runs, in general, the less will be the current flowing, and hence the less the absolute pulling force of the motor.

As dynamos vary in mode of action, so do motors. The different types of winding cause the motor to act differently under the same conditions of current and speed. There are motors which have a constant speed with a varying pulling power, others which have a constant pulling power with a varying speed, also a most important class with which the pulling power and speed vary immensely. As the electric motor problem stands to-day, an engineer has only to draw on paper a curve of variation of speed, with pulling power, and any of the first-class electric companies will furnish a motor which will meet the demand almost exactly, so far as the power and speed are concerned; whether slow or fast matters not. But if a certain degree of efficiency is asked for in connection with fixed relations of speed and power, the problem has a different character. All degrees of efficiency are not possible under all conditions of variations of power, hence the difficulty.

The class of motors most applicable to railroad use is the "series" motor, so called because the entire wiring of the circuit and magnetic field is in a series, that is to say, as one continuous wire. Such a motor has a maximum torque, *i. e.*, turning moment on the shaft—at slow speeds and at starting. At such times trains offer most resistance, and hence require greater pulling power from the motors. It is hardly worth while to consider now any other form of motor for railroad use, as in order to make the other forms of equal power in starting a train, they must have a connection between the armature and the wheels, which will permit the motor armature speed to be independent of the speed of the wheels of the motor itself. It is not too much to say that no means for making such a connection that is practicable have yet been devised.

Early in the development of electric motors a friction clutch was tried, and is now often suggested, but

the energy lost in heat in the clutch is too great to allow its use. It is true of all motors that start with a sliding friction, such as friction clutches and cable grips, that just double the energy is absorbed at starting from a standstill that is required by a steam motor with direct connections to the driving axles. The reason for this is quickly understood. The pull and speed of the cable through the grip, or of the armature with a friction clutch, is constant for uniform acceleration, or nearly so, during all the time the car is accelerating to speed. Hence, the horse-power used at the stationary plant is at least as great at the instant of starting as at all times during acceleration, because horse-power is directly dependent upon the product of the speed and pull.

Now with the steam locomotive the pull is constant for uniform acceleration, or nearly so, but the speed of the pistons varies from zero to a maximum, hence the horse-power used varies from zero to a maximum. The maximum is equal to that used uniformly by the cable or armature with a friction clutch, omitting all losses of transmission. Hence, for uniformly accelerated trains, the average horse-power used by steam locomotives is but one-half that used by a cable or armature with a friction clutch.

For these reasons the friction clutch was abandoned, and there is to-day no satisfactory mode in use or proposed of making a connection between an electric-motor armature and the driving wheels which will permit the armature speed to remain partially constant while the driving wheel speed varies. The state of the art, then, renders necessary the stopping of the armature when the train stops and the starting of the armature as the train starts, and a constant relation between the speed of the two.

Under this condition the pull or torque of the motor must be very great at starting; that is, before the armature has commenced to revolve, otherwise the train will be started too slowly, and this is what makes the "series" motor of especial value for train work. At slow speed it has its greatest torque, which can be utilized for a considerable number of seconds without danger of overheating the motor bobbins or wire. This period gives sufficient time for the trains to get up some little speed: this increase in speed automatically chokes off the oncoming current by the generation of counter current, hence less current flows, and the heating is reduced. Thus, if the series motor is made powerful enough to start a train, it acts as its own safety valve, and prevents burning out of the coils. So far, then, as the power of a motor is concerned, the problem before an engineer, who desires to make a selection, is easy. A simple diagram showing the required relation of speed to the power necessary to move a train at varying speeds, will enable any good electrical company to furnish a series motor to do safely and continuously the actual work just as required.

But with what economy? The only answer is: *It all depends upon the character of the service*, and is simply a result of the imposed conditions. In what follows we omit all that fine pointed argument which would tend to show the statements we make regarding economy to be only approximate; that is admitted, but the difference between the actual economy and that given by the simple theories we use, is too small to make any practical difference in the conclusions which an engineer would reach in selecting a motor for a given duty; and we consider only the series motor, as it alone is now believed to have the characteristics necessary for train work. The series motor then is the type that interests more particularly the railroad engineer who is looking for electric motors strictly for train work. Its efficiency is a varying quantity, and depends almost directly upon the speed at which the motor is run—supposing always that the motor in question has been designed and constructed by a responsible electric company.

At starting, the series motor uses up the entire current given to it to maintain the pulling force or torque, and until the train starts there is no useful work done, and hence at this time the efficiency is zero and the pulling force is at a maximum. One now sees how essential it is that the start be made quickly, and that there be no hesitation at starting, for the reason that during all that period there is a large current flowing and little or no useful work is done. When this motor has reached full speed the efficiency is high, and it is not impossible to reach 90 per cent. At this time the pulling force is at a minimum and comparatively little work is done, but what is performed is done at a high rate of efficiency. At about half speed the efficiency is 50 per cent. At this point the torque or pulling force is considerable, but not nearly as much as when at rest, and also at this point the work done is at a maximum.

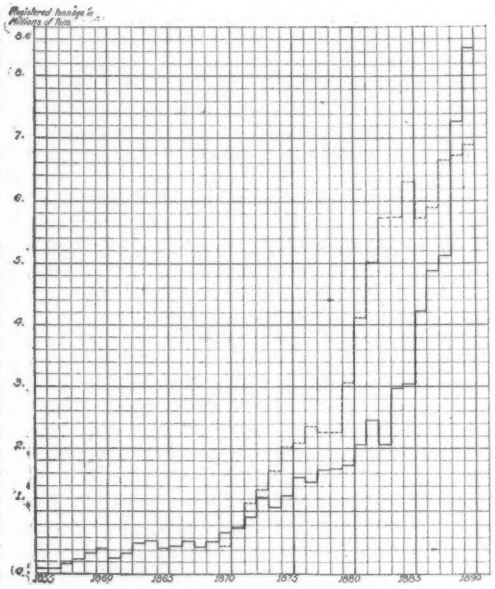
(TO BE CONTINUED.)

The Traffic of the Sault Ste. Marie and the Suez Canals.

We give below a diagram showing the traffic on these two canals. Up to 1855, when the "Soo" Canal was opened by a private company, aided by a land grant from the general government, the freightage from the Lake Superior region had been insignificant, and, as will be noticed, it continued small, but with a pretty regular rate of increase, until the operations of the Northern Pacific Railroad at the head of the lake commenced to draw capital and emigrants that way.

The old canal had two locks 70 ft. × 350 ft. in plane and of 9-ft. lift each for an 11-ft. navigation. This was bought by the government and contracts were let in October, 1870, for the present lock, with one lift for a 16-ft. navigation, 80 ft. × 515 ft. in plane. The first boat passed through the new lock on October 1, 1881. For these reasons the profile of the tonnage passing through this canal, instead of showing curves of developed traffic, show, roughly, three slopes, each succeeding one with a greater inclination.

The Suez canal, which was begun in 1859, was opened for traffic Nov. 17, 1869, and passed 436,609 tons of shipping in 1870, as against 690,826 tons passing through the "Soo" canal the same year. The increase of traffic in the Suez canal was not marked for the first 10 years. From 1879 to 1885, however, the increase was very great,



Tonnage through the Sault Ste. Marie and Suez Canals.
Dotted line shows Suez Canal; full line Sault Ste. Marie Canal.

almost paralleling the rate of increase on the "Soo" for the last six years. Since 1885 the traffic on the Suez canal has remained virtually stationary, showing either that the resources of India and Australia are not increasing very fast, or that the canal is worked to about its convenient capacity, or possibly both causes are operative.

The rapid increase of traffic in the "Soo" canal since the enlargement of the lock has a decided bearing on the proposition lately made to decrease the projected depth of the waterway connecting Chicago and the Illinois River from 18 to 10 ft., and on the proposal to build the canal between Lake Erie and Pittsburgh with only 14 ft. on its mitre sills. The Canadian engineers, who are agitating for an improvement of the St. Lawrence canals, that will give vessels of 20 or 25 ft. dratt access to Lake Ontario, see it in that light, and are urging a change in the plan for their lock on the north side of the Sault, so as to have 20 instead of 18 ft. on its mitre sills. They evidently look to securing a 20-ft. navigation, or combined navigation and ship railroad, from the head of Lake Superior, through their own territory, to the sea.

For the past two seasons the canal at the "Soo" has passed more tonnage than the Suez canal, the figures being:

	Sault Ste. Marie Canal.		Suez Canal.	
	Vessels.	Registered tonnage.	Vessels.	Registered tonnage.
1889.....	9,576	7,561,000	3,425	6,783,187
1890.....	10,557	8,454,435	3,389	6,890,014

Last year the tonnage of the American canal was 22.8 per cent. in excess. With the increase in tonnage there has been a notable fall in the value per ton of the freight transported. This is shown in the subjoined table, taken from the reports of our government engineers in charge of the lock:

	Actual freight (tons 2,000 pounds)			
Season.	East bound.	West bound.	Valuation of freight tonnage.	Average value per ton.
1881.....	965,236	455,111	$28,965,612.94	$18.47
1882.....	1,338,027	691,494	31,238,153.68	15.39
1883.....	1,277,283	988,822	39,730,663.56	17.53
1884.....	1,900,296	965,267	51,965,786.61	18.06
1885.....	2,135,066	1,121,562	53,413,472.13	16.40
1886.....	3,179,943	1,347,816	69,080,071.95	15.26
1887.....	3,749,446	1,745,203	79,031,757.78	14.38
1888.....	3,923,344	2,488,079	82,156,919.97	12.81
1889.....	5,552,641	1,963,381	83,732,527.15	11.14
1890.....	6,428,838	2,612,375	102,214,948.70	11.31

That is, the average value of the freight passing through the lock was 63.3 per cent. higher in 1881 than in 1890, and it is probable that a great part of the freight would not have found a market if it had not been for the cheap transportation offered by the canal.

The abolition of highway grade crossings does not seem to progress with astonishing rapidity in Massachusetts; and the law of 1890, by which the state offered to pay 25 per cent. of the cost of each change, thus removing the chief cause of contention between municipalities and railroads, has already turned to ashes in the mouths of some who expected immediate advantages from it. The trouble comes from the fact, which we pointed out in discussing the subject last June, that it is to the advantage of the railroads, under the law, to remove country crossings rather than those in cities; and the city of Worcester has appealed to the legislature for a change in the law. The railroads were on the alert, and immediately on the passage of the law applied for authority to change 37 crossings, every one of them in a country district. The Boston & Albany was the leader, making 26 of these applications, partly because it needs the added safety more than the smaller roads do, and partly because it had agreed, in getting authority to issue new stock, to spend the first million dollars for this purpose. But when it came to a city crossing (change applied for by the city), where the land damages would be high and the 65 per cent. of the expense, which must be paid by the railroad, would include the cost of a good deal of property and improvements outside the railroad location, the companies took all possible means to cause delay. One clause of the law, that which forbids the changing of the grade of the track without the company's consent, affords them unfailing aid in this policy, in a great majority of cases, and it is this clause that the Worcester people want abolished. The legislature, however, will not comply with their demand, as the majority think the city ought to try a little harder to get justice from the courts before asking for a change in the general law. The Supreme Court, if appealed to, probably could order a bridge built without disturbing the tracks, even if the cost, which the railroad would have to share, were thereby largely increased; but the city in thus punishing the railroad would itself suffer also, and it may be that the almost absolute protection now accorded the railroads will have to be eventually modified. Whenever the applications for changes under the law aggregate a probable cost of more than $2,000,000 for a single year, the Railroad Commissioners will have to step in and order the refusal of some of them, as the State appropriation is limited; and the relative rights of cities and small towns may then receive adjudication; but the $2,000,000 line has not yet been approached.

Chairman J. F. Goddard, of the Trunk Line Association, has made a report on the live-stock rate question which was referred to him for arbitration. He finds various minor irregularities, but is unable to recommend any definite change. He simply tells the roads to strictly carry out the agreement of April 9, 1889. This was, in effect, that each road might make free delivery of animals within the lighterage limits of New York harbor, the rate, 26 cents Chicago to New York, being the same by all roads. The cost of this delivery by lighters is about 3½ cents per 100 lbs.; it has come to be paid through the stockyard companies instead of directly to the boats, and so yardage fees have got mixed up with it, and abuses have crept in. The Lackawanna road delivers to Forty-fifth street, East River, and apparently allows, for yard facilities and lighterage together, much more than 3½ cents. This is understood to have diverted considerable traffic and was a chief cause of the complaints that were made. On the other hand, it appears that other shippers are, through their interest in stockyards, receiving indirect advantages which are equivalent to some reduction in net rates; but Mr. Goddard is unable to estimate this advantage, and submits the following rule as the best solution of the question:

"Each company to charge and collect on all cattle, wherever delivered, the agreed through rates. Each company may make deliveries within lighterage limits in New York harbor, paying therefore the actual cost of the service, but not to exceed in any event 3½ cents per 100 lbs. No refund or allowance to the stockyard companies for yardage or other purposes to be made, and no refund to be made in any case to shippers or consignors of like stock or to others for their account."

The Secretary of the Treasury is preparing a revised set of regulations for the transportation of freight into the United States from foreign countries. In answer to inquiries and to the criticism that there is an intention to favor American roads at the expense of Canadian lines, Secretary Foster says that there is to be no discrimination either in favor of or against Canadian roads. The new regulations will simply establish the same rules for goods coming in bond through ports of entry on the Canadian border, as are already in effect at other ports, such as New York or Boston, or points on the Mexican frontier. The practice hitherto pursued has discriminated in favor of goods coming from or through Canada, as they were carried in sealed cars and the seals were not broken until arrival at destination, whereas a shipment, for instance, from England, bound for Chicago via New York, had to be inspected by the customs officers in New York. The system of having treasury agents in the interior of the Dominion has not worked well, the sealing of cars, which should have been done by them

having been, in fact, sometimes done by the railroad companies. It is suspected that seals have been tampered with and cars reloaded with goods calling for a smaller duty than that assessable on the goods originally shipped, and the new regulations will therefore require all cars to be opened at the frontier. There will be no more delay than is necessary to assure the inspector that the goods correspond to the invoices, which, for nearly all freight, will, of course, be trifling.

The case of the Delaware State Grange against the New York, Philadelphia & Norfolk deserves more attention than it has received. Although the decision of the Interstate Commerce Commission was against the railroad company in this particular instance, it is based on grounds which, in the majority of cases, would help the roads instead of hurting them. It is held that the higher rate for a special service should bear a just relation to the value of the service to the traffic, and is not wholly in the discretion of the carrier. While a carrier should be fully compensated, the public interests require that the traffic should not be rendered valueless to the producer. The requirement of the statute that all rates shall be reasonable and just involves a consideration of the commercial value of the traffic, and implies that rates should be so adjusted that producers of traffic as well as carriers may carry on their pursuits successfully, if practicable for both and without injustice to the carrier. This, it will be seen, is an explicit recognition of the principle of charging what the traffic will bear, as applied to high-class goods. There is no logical stopping point short of applying it to goods of every kind. According to this view, not merely may railroad managers make rates to develop business, but they *must* do it.

General William A. Hamill has been appointed Railroad Commissioner by the Governor of Colorado. There has been extended discussion in the Colorado Legislature this session over a proposed law creating a railroad commission with extensive powers, similar to those exercised by the boards of Iowa, Kansas, etc., but none of the proposed measures became a law. The appointment now made is under the authority of a law passed in 1885 providing for a commissioner with advisory powers, similar to those exercised in Massachusetts and New York. It appears that the law has been practically a dead letter since 1887, as in that year the Legislature refused to make an appropriation for the salary of the commissioner appointed by the Governor, and the office has since been vacant.

The Long Island Railroad Company is one of the very few in the United States which still use vacuum brakes. This company has about 400 cars running in passenger service. These are equipped part with the Smith and part with the Eames vacuum brake. The company has now decided to replace this entirely by the Westinghouse quick-acting apparatus, which will accordingly be done at once. There are probably at least 100 locomotives, also, to be fitted with brake apparatus. When this change is completed there will be left but three or four companies, with an aggregate of probably less than 100 cars, using the vacuum brake on surface roads. Of course it will be understood that this statement does not include the elevated roads and the Brooklyn Bridge.

Superintendent Carman, of the Western Railway Weighing Association, has secured the indictment of another party which has been tampering with his weighmasters. This time it is the firm of Howell, Jewett & Co., doing business at various points on the Missouri River. A charge was also made against Edward Tibbetts, their yard foreman at East Atchison, and indictments were found by the grand jury under a provision of the Interstate Commerce Act providing penalties for inducing an agent of a common carrier to discriminate unjustly against other shippers. It is understood that grand juries at other points have been furnished with evidence which will shortly result in further indictments.

In a recent issue of the New York *Tribune* the first name under the "Obituary" head was that of the Western Traffic Association. Perhaps the foreman of the composing-room, or other functionary who brought about that arrangement, was a better prophet than he intended to be. At any rate, the affairs of the Association do not prosper. The meeting of the Advisory Board held this week could not muster a quorum, and the Wall street reporters are filling columns with speculations as to whether it is tic-douloureux or general debility or some more obscure malady that keeps Jay Gould in Arkansas and thus blocks the proceedings.

The April report of the Department of Agriculture is most encouraging. The condition of winter wheat shows an average of 96.9. This high figure has been reached in April but once in ten years and but three times in the history of the Department reports. The averages by states are remarkably uniform. The condition is much the same as in the spring of 1884, in which year was produced the largest crop ever grown. Further, there is a threatened deficiency in the crop in competing countries.

The bills before the Ohio Legislature regulating the appointment of conductors and telegraph operators are reported passed. Operators must be at least 18 years old and have a year's experience at telegraphing before being allowed to receive train orders. Conductors must have had two years' experience as brakemen, and before running a passenger train must have served two years as freight or work-train conductor.

NEW PUBLICATIONS.

The Sioux City Bridge. A report to Marvin Hughitt, President of the Sioux City Bridge Company. By George S. Morison, Chief Engineer.

This is a pamphlet of the form, and prepared with the thoroughness, to which we are accustomed in Mr. Morison's reports. The text and tables occupy 17 large pages (9 in. × 17 in.) and there are 17 plates. Altogether the report gives about all the information that one wants concerning this bridge except its cost.

Congress authorized the construction of the bridge in August, 1876, but no active steps were taken till the Winter of 1884-5, when surveys and borings were made. The original site selected was at the foot of Kansas street, but this was abandoned on account of the difficulty encountered in securing right of way, and the bridge was located at Sawyer's Bluff. Work was begun in the Summer of 1887, and the first train crossed the bridge November 26, 1888.

The bridge is a single track railroad bridge, and as originally designed, consisted of three spans of 400 ft. each, and one plate-girder span of 61½ ft., extending from the east pier to the bluff. In the winter of 1888 the channel had changed its position so as to leave the greater part of the bridge over dry land, and to meet the altered conditions another span of 400 ft. was added, so that the bridge as completed consists of four spans of 400 ft. each and one girder span of 61½ ft., the total length from out to out of steel work being 1,675 ft.

The piers are founded on the prealluvial gravel, which also forms the foundation of the bluffs east of the river, the pier foundations being sunk to a depth of 50 ft. below the alluvial deposit. Some difficulty was experienced in construction from high water and ice, but the damage was chiefly in delay to the work. The foundations are of limestone from Mankato, Minn., and the dimension work exposed to the frost is of granite from Morton, Minn. The total amount of masonry is 6,990 cu. yds. and of concrete 7,181 cu. yds., being 14,171 cu. yds. in all.

The superstructure, as stated, consisted of four through spans, pin connected, and the trusses, built entirely of steel, are 50 ft. deep and placed 22 ft. between centers. The length of each span is 400 ft., being divided into 15 panels of 26 ft. 8 in. each. The girder span is also of steel, except the web plates.

Annual Report of the Harbor Commissioners of Montreal for 1890.

This report shows a continued increase in the number and tonnage of ocean ships using that port. In 1890 the total number of steam and sailing seagoing ships was 746, with a tonnage of 930,332 against 710 ships in 1880 with a total tonnage of 628,271. The 27½-ft. channel has been completed from Montreal to Cap Charles, excepting for a portion of the excavation at Cap à la Roche and some slight dredging below that point which will be necessary to give the full depth at low water. The plans for harbor improvement and flood protection adopted by the Privy Council have been approved by the Governor-General and it is expected that the work can be pushed to completion. The plans provide for a great increase of dock room, protection piers and a dyke wall along the river front at the side of Common and Commissioners streets, the cost being estimated at $2,827,894, of which the city will furnish $708,428.

Rubber Hand Stamps and the Manipulation of India Rubber. By T. O'Conor Sloane. New York: Norman W. Henley & Co., 150 Nassau street; 1891. 142 pages and index; illustrated. Price $1.

This little book is intended as a practical treatise on the manufacture of hand stamps and other small articles of India rubber. It treats also of special inks, cements, etc. It is designed to teach the manipulation of this difficult material by simple processes that can be used at home. Dr. Sloane's large experience in teaching and in scientific writing of a popular sort has enabled him to prepare a book which will be interesting and useful to many ingenious persons, young and old, with a turn for mechanical matters.

Pennsylvania Relief Department.

The fifth annual report of the Pennsylvania Railroad Voluntary Relief Department for the year ending Dec. 31 last has just been issued. The business for the year amounted to a little less than half a million dollars, the receipts and payments being about equal and the balance about the same as at the beginning of last year. The payments are classified as follows:

Benefits Paid, 1890.

	No. of payments.	Amount paid.	Average per payment.
Death from accident...	81	$48,912	$603.85
" " nat'l causes,	260	142,125	546.63
Disablem't from accid't	6,512	87,884	13.50
" " sickness	17,673	187,372	10.60
Total	24,526	$466,294	.....

The sum set aside two or three years ago as a foundation for a fund for superannuated members now amounts to $185,000, but the committee having it in charge has not yet arrived at any satisfactory plan for putting such a fund in operation. The amounts paid by the railroad companies for the year 1890 were as follows:

Operating expenses.....	$69,838
Additional relief to members who had exhausted their title to sick benefits.....	$16,673
Total.....	$86,511

The accessions to membership during 1890 were 6,609, averaging 551 per month, and exceeding the deaths and withdrawals by 6,087. The number of members leaving the service was 2,560, making a net gain of 3,527 during the year, and the total membership at the close of the year, 24,984. The average monthly membership for the year was 23,523. There were 344 deaths during the year, the death rate being equal to 14.6 per thousand members. The average number of members constantly disabled was equal to 42.7 per thousand members.

There were 36 deaths and 3,783 disablements from the epidemic of influenza prevailing in the earlier part of the year. Seventeen and a half per cent. of the members were affected by this epidemic, and the cost to the fund from this cause for benefits paid was upward of $50,000.

Abstract of Patents on the Compound Locomotive.

III.

The first part of this abstract was published in the *Railroad Gazette* of Feb. 13. For the tabulated list of patents the reader is referred to that issue.

XXX.—Pat. No. 405,570. (*American Patent.*) *Inventor, R. H. Lapage. Dated June* 18, 1889. Claim: 1. In a compound locomotive engine, the combination of a high-pressure cylinder or cylinders mounted upon the locomotive proper, a low-pressure cylinder or cylinders mounted upon a bogie or vehicle connected to said locomotive proper, pipes or passages connectiug said high and low pressure cylinders, and a ball-and-socket joint between said pipes, said ball-and-socket joint forming a pivot for said bogie or vehicle and comprising a ball and a socket, one of these parts being secured to said locomotive proper and the other to said bogie or vehicle.

2. In a compound locomotive engine, the combination of a high-pressure cylinder or cylinders mounted on the locomotive proper, a low-pressure cylinder or cylinders mounted upon a bogie or vehicle connected to said locomotive proper, pipes or passages connecting said high and low pressure cylinders, a ball-and-socket joint connecting said pipes or packages, forming a pivot for said bogie or vehicle, and comprising a ball and socket, one of these being connected to said locomotive proper and the other to said bogie or vehicle, and a sliding or telescopic joint between parts of said pipes or passages.

3. In a compound locomotive engine the combination of high-pressure cylinders mounted upon the main frame of the locomotive, low-pressure cylinders mounted upon a bogie truck or swivel frame, pipes or passages, and connecting said high and low-pressure cylinders, hollow ball and parts forming a ball-and-socket joint between parts of said pipe or passage, and an exhaust pipe, one part of said ball-and-socket joint being carried to the main frame, and the other part by the bogie truck or swivel frame.

4. In a compound locomotive engine the combination of high-pressure cylinders mounted upon the main frame of the locomotive, low-pressure cylinders mounted upon a bogie truck or swivel frame, pipes or passages connecting said high and low pressure cylinders, a ball-and-socket joint arranged between parts of said connecting pipe, and exhaust pipe constructed in two parts, said parts being connected with each other by a working joint and placed in communication with each other by a pipe arranged above the ball-and-socket joint.

XXXI.—Pat. No. 406,011. (*American Patent.*) *Inventor, S. M. Vauclain. Dated June* 25, 1889. Claim: 1. The within-described compound cylinder structure for locomotives, said compound structure comprising a portion on the outer side of the engine frame and a portion on the inner side of said frame, the portion on the outer side containing the high and low pressure cylinders, situated side by side, and the valve-chest structure for said cylinders and the portion on the inner side containing the inlet and exhaust passages which extend up to the smoke-box, so that the structure is capable of being substituted for the usual single-cylinder structure of a locomotive without change of the adjacent structure.

2. The combination of the valve stems, each having a valve, with the high and low pressure valve chests, each having central inlet chamber, opposite end ports communicating with the cylinder, and two sets of intermediate ports, the induction ports communicating with the end ports, the eduction ports of the high-pressure chest communicating with the inlet chamber of the low-pressure chest, and the eduction ports of the latter communicating with the exhaust passage.

XXXII.—Pat. No. 406,012. (*American Patent.*) *Inventor, S. M. Vauclain. Dated June* 25, 1889. Claim: 1. The combination, in a valve structure for compound engines, of the valve chest having supply ports, high-pressure induction and eduction ports, low-pressure induction and eduction ports, and final exhaust port, with a hollow valve having an internal passage providing communication between the high-pressure ports and the opposite low-pressure ports, and a passage between the latter and the exhaust port.

2. The combination, in a compound engine, of the high and low pressure cylinders situated side by side, the valve chest common to both cylinders and situated at the side thereof, said chest having supply ports at the ends, a final exhaust port at the centre, high-pressure induction and eduction ports adjoining the steam supply ports, and low-pressure induction and eduction ports adjoining the final exhaust port, with a hollow valve having an internal passage connecting opposite high and low pressure ports, and a passage connecting the latter ports and the exhaust port.

XXXIII.—Pat. No. 409,936. (*American Patent.*) *Inventor, J. des Brisay. Dated Aug.* 27, 1889. Claim: 1. The combination with two high-pressure cylinders, a rotary valve controlling both cylinders, a passage leading from said valve into the smoke box, and a valve therefor, of the low-pressure cylinder and a passage leading from said rotary valve thereto.

2. In a locomotive, the combination, with two high-pressure cylinders and two low-pressure cylinders of a rotary valve controlling both high-pressure cylinders and two rotary valves deriving steam from the first named rotary valve and controlling the said two low-pressure cylinders.

3. The locomotive, the combination, with two high-pressure cylinders and two low-pressure cylinders, all connected with the driving wheels, of a rotary valve controlling the inlet and exhaust steam of the said high-pressure cylinders, two additional rotary valves connected by a passage with the exhaust port of the said first named rotary valve, said two rotary valves controlling the low-pressure cylinders, and a condenser into which the exhaust steam from the said two rotary valves is discharged.

The combination, in a locomotive, with two high pressure cylinders and a rotary valve controlling both cylinders, of a low-pressure cylinder into which said rotary valve exhausts, having a rotary valve provided with a shaft rotated from the shaft of the first named valve, the pistons of the several cylinders being connected with the driving wheels.

TECHNICAL.

Manufacturing and Business.

The Dayton Mfg. Co., Dayton, O., has received an order for lamps and all the trimmings for the interior of a fine state carriage, to be built by the New South Wales Gov-

ernment Railroad Commissioners, for Lord Jersey, Governor of New South Wales. The trimmings are to be the company's Persian brass design finished in oxidized silver.

Carnegie, Phipps & Co. are erecting a new building at their Upper Mill Works, at Pittsburgh, for manufacturing bridge girders. The firm expects to finish it this month, and have about four times the present capacity.

The office of the Consolidated Car-Heating Co., in Chicago will, after May 1, be at No. 200 Phenix Building instead of No. 616.

A certificate of incorporation of the J. Hoyt Brown Automatic Car Coupler & Railroad Supply Co., of Denver, has been filed in Colorado. The capital stock is $500,000. The incorporators are James Hoyt Brown, Henry Deitz, J. H. Kimball, W. W. White and Lambert Sternberg.

The Emerson Car Ventilator Co., has been organized at Charleston, S. C., with A. S. Emerson as President and J. W. Smith as Secretary. The company will manufacture the Emerson patent ventilators for railroad cars. The ventilator will be put on a few of the cars of the Central of Georgia for experiment and probably also on the Plant system and the Atlantic Coast Line.

Articles of incorporation of the Trojan Car Coupler Co. were filed April 8 with the Secretary of State, at Albany, N. Y. The capital stock of the company is $300,000. The new corporation will absorb the business heretofore carried on by Burden, Renshaw & Co., of Troy, N. Y., patentees and manufacturers of the Trojan coupler for freight and passenger cars. The business will be located in Troy as in the past. The new corporation is strong financially, and the manufacturers of the coupler have gained an excellent reputation for good work and material. A large number of Trojan couplers have been put in use on a number of roads since last October, and we understand there has never been a complaint of breakage of any kind.

The Botsford Steam Car Heating Co., which now has works at Lorain, O., has filed articles of incorporation in Ohio with a capital stock of $100,000. The business of the company is to be removed from Lorain to Akron.

The Shaw Electric Crane Co. has secured a site for shops at Muskegon, Mich., and will remove its works from Milwaukee to that town. A large foundry and workshops are to be erected at once, and part of the plant will be in operation about Sept. 1. It is said that between 400 and 500 men will be employed at the new works. The company will be reorganized under the laws of Michigan.

The Richmond Standard Spike and Iron Co. has work on its new building at Iron Gate, Va., far advanced, and expects to be employing about 300 men in June.

The Gould Air Brake Co. was organized at Buffalo, N. Y., this week. Charles A. Gould has been elected President, Henry C. Gould Vice-President and Treasurer, F. P. Huntley Secretary, and Edward R. Knowles and Ernest C. Webb Directors. The company, in addition to two or three patents owned by itself, has bought the exclusive right to manufacture brakes under the patents of the United States Air Brake Co., of New York City. This brake has been in service for over a year on the New York, Susquehanna & Western. The connections are interchangeable with the Westinghouse air brakes. The company will also manufacture locomotive brakes and bumps.

A. R. Schultz, H. W. Oliver, T. S. Bigelow, T. W. Herzogg and D. D. Oliver, of Pittsburgh, have applied for a charter for the Schultz Bridge & Iron Works. H. W. Oliver is President. The directors are T. S. Bigelow, A. R. Schultz, D. D. Oliver and T. W. Herzogg. The firm will have works at Chartiers Station, and will do all kinds of bridge and structural iron work.

Iron and Steel.

The Bessemer steel plant of the Bethlehem Iron Co., where important repairs and improvements have been made, was started this week on orders for 75-lb. rails. The new bending press for armor plate, in connection with the 12-ton hammer, at the Ordnance Works, is nearly completed. A 22-ton anvil, for the bending press, was cast last week.

A new iron mill will be erected at Hays station, Pa., six miles from Pittsburg. The people interested are ironworkers, who have formed a corporation with a capital stock of $150,000, and bought 80 acres of land at Hays upon which to erect a plant. R. Carter, recently manager of the Sligo mills, will be manager of the new concern. The mill will have 20 puddling furnaces and a 12-in. train of rolls. The plant will be substantially erected, protected by an iron-clad building, and will probably be in operation in the fall.

W. J. Lewis, Henry Lloyd, Cephas Taylor, William J. Lewis, Jr., and Edgar K. Stephenson filed a charter for the Linden Steel Co. in Pennsylvania this week. This action will simply change the firm from a partnership to a corporation. There will be no change that will affect ownership of the mill in any way.

The plant of the Watts Steel & Iron Co., at Middlesborough, Ky., is being rapidly pushed to completion, and it is hoped to have the entire works in operation in a few weeks.

The new iron furnace at Jefferson, Tex., recently completed by the Lone Star Iron Co. has been blown in. The company has decided to operate a steel plant in connection with the furnace. The new plant will probably cost $1,000,000, and additional furnaces will follow.

McVay, Walker & Co., Braddock, Pa., are erecting a new foundry on a 450 × 90 ft. lot, which is intended to do much of the heavy work for the Edgar Thomson Steel Works of Carnegie Brothers & Co., Ltd.

Edmund D. Smith & Co., No. 208 South Fourth street, Philadelphia, have been appointed sales agents for the Illinois Steel Co. for Philadelphia and vicinity.

The many conferences which have been held between the Joliet Steel Co. and its employés have resulted in an arrangement of the wages question at least until the close of 1892, after which six months' notice must be given of a desire to change by either side. A sliding scale was adopted last week.

The iron and steel firm of Ellis & Lessig, Pottstown, Pa., announces that it has favorably considered the offer of $100,000 and 40 acres of land made by the citizens of Salem, Va., if it would remove its plant there. It employs 700 men.

The Rail Market.

Steel Rails.—Many of the larger roads have placed orders this week. The *Iron Age* reports sales of 4,000 tons to the Erie road, with an option on 6,000 more; 9,000 tons for the New York Central, 1,500 tons for the New York, Providence & Boston, and 1,000 tons for export to Mexico, and it is reported that the Lehigh Valley has also ordered 7,000 tons. The official report of the sales up to March gives the sales for 1891 delivery as 418,447 tons, of which Western mills took about 225,000 tons. Since then about 130,000 tons have probably been ordered. The deliveries, however, have been exceedingly light thus far, having been probably less than 175,000 tons up to April 1, of which only about 65,000 tons were by Western mills. The quotation at tidewater is $30.25 @ $30.75.

Car Heating.

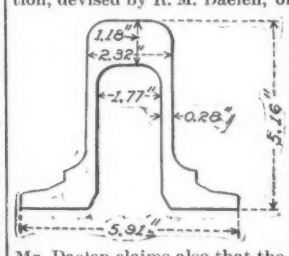
One hundred passenger cars of the New York, New Haven & Hartford road are being equipped with the Safety Car Heating and Lighting Co.'s appliances in connection with the Baker heater. In a recent test they showed the circulation to be perfect in the whole train in from ten to twelve minutes.

The Leland Car-Heater & Steam-Coupler Co., of New York, has been incorporated with a capital stock of $40,000 to manufacture car-heaters and steam-pipe couplings.

The Delaware, Lackawanna & Western, after three winters' practical use of the Gold system of steam heating on about 200 cars, has decided to equip its entire passenger rolling stock (upwards of 300 cars) with system. The Boston & Maine has also given an order for equipping a number of cars after having made a practical test on one car. The Gold Car Heating Co. is equipping cars for the following roads: New York, Lake Erie & Western, New York, New Haven & Hartford, Chicago & Eastern Illinois, New York & Northern, and Western New York & Pennsylvania. Steam heating apparatus has been shipped to the following car shops for cars being built: Pullman Palace Car Co., Gilbert Car Co., Barney & Smith Mf'g. Co., Wason Mf'g Co., Laconia Car Co. and the Ohio Falls Car Co. The Gold Co. has recently completed tests showing that the Gold storage-heater system and the duplex double-coil system work together to great satisfaction, that is, a train may be partly equipped with one system and some of the cars with the other and all cars will be heated comfortably.

A German Rail Section.

The annexed illustration represents a form of rail section, devised by R. M. Daelen, of Düsselldorf, Germany.



In it the main dimensions of the heavy, flange rails, now in extended use on German railroads, have been retained. Mr. Daelen proposes to roll the rails from flat plates, made to gradually assume the final shape, the claim being made that all portions of the section are subjected to pratically the same tension during the rolling process. Mr. Daelen claims also that the rail can be finished in fewer passes than the usual form, leaving the rolls, therefore, at a higher temperature, and that the cracks frequently formed in the wide flange rail can be entirely avoided in the proposed form. The new rail can be fastened to the ties in the ordinary manner. Nothing, however, is said of the joint to be employed.

Of course everybody knows that the ∩ section is an old one, having been used in England and the United States in the very beginning of steam railroads.

The Edison Electric Percussion Drill.

The Edison General Electric Co. gave an exhibition of their electric percussion drill recently in Quncy. The result of the exhibition was very satisfactory, and the opinion expressed by parties well versed in such matters was that the electric percussion drill is far ahead of the steam or compressed air drill. Although the stone in Quincy is exceptionally hard, the electric percussion drill was able to drill a hole 1¼ in. diameter, at an average rate of 2¼ in. per minute, with an expenditure of power less than 4 H. P. delivered to the generator. At one time the rate of drilling was as high as 4 in. per minute. Among the special features brought out by this exhibition were the extreme ease with which the power could be transmitted to the drill from the generating station, and the great simplicity of the machine itself. The wires were taken from the edge of the quarry direct to the place where the drill was at work, without any further intermediate supports being needed. The distance along the wires was 350 ft., the vertical distance between the drill and the edge of the quarry 100 ft. The drill was several times opened and entirely taken apart—the time required for this being less than three-quarters of an hour.

The Wear of Rails.

In the *Organ für den Fortschritt des Eisenbahnwesens* reference is made to some tests recently carried out to determine the wear of steel rails of different degrees of hardness. The chemical and physical characteristics of the rails tested had been accurately determined, and the test for wear consisted in letting 26,120 trains pass over them during a period of 1,833 days. The rails were then thoroughly cleaned and weighed, and the difference between the initial and final weights accepted as giving the loss from wear and rusting. The tests are said to have shown that the wear thus determined was in about an inverse proportion to the tensile strength of the metal, so that it would appear to be advantageous to insist upon high tensile strengths.

New Railroads in Honduras.

The Bureau of the American Republics at Washington, D. C., has received information from a correspondent in Honduras to the effect that English engineers are now at Puerto Cortez preparing to survey an extension of the railroad which now extends from the port of San Pedro, 39 miles, to Port Rerillos, 31 miles farther, and 70 miles from the coast. This road could be used as the first division of the interoceanic railroad from the Caribbean Sea to the Pacific. The capital for this work has been provided by an English syndicate; and as soon as it is completed it is their intention to finish the road to the Bay of Fonseca.

A French company has also obtained a concession to build a railroad from San Lorenzo, on the Bay of Fonseca, to the capital, and it is their intention to proceed with the work immediately.

The Morton Stored Heat System.

The Morton safety heater has been tested this winter on the Intercolonial and Grand Trunk roads, and a temperature of 70 degrees was easily maintained inside the cars with the temperature outside varying from 30 degrees above zero to 20 degrees below. The results of the tests have been very satisfactory. The Morton heater has been described in these columns before. It is, in brief, a system of storing the heat in an earthenware tube, which is inclosed in an iron pipe. Steam from the locomotive is applied for a short time and sufficient heat is stored to keep the car comfortably hot for some hours.

The tests on the Grand Trunk referred to began Dec. 16, when the system was applied to a train of four cars running between Montreal and Lachine, along the St. Lawrence River. The thermometer has ranged from 30 degrees above to 20 degrees below zero; the average temperature for December being 5 degrees above zero. In the coldest weather from five to ten minutes' application of steam every two hours gave a temperature inside the train from 68 degrees to 72 degrees. This train was left out on track every night at ten o'clock at 70 degrees, and at 5:30 next morning was always from 30 degrees to 40 degrees above zero. A second train of four cars has been completed for this road, and is running daily on the Island Pond route. On March 11 the engine broke down near Island Pond, and a freight engine was attached; the train was without steam for five hours, and on arrival at Montreal the thermometer registered 65 degeees in the cars.

On the Intercolonial equally good results have been obtained. On Jan. 29 a train was run between Halifax, N. S., and St. John, N. B., 275 miles, and a regular temperature of from 70 degrees to 72 degrees maintained the entire distance, by application of steam for five minutes each hour.

Tests made in milder climates have also been satisfactory, and it has been found easy to regulate the heat. The heater has been used on the Shenandoah Valley between Shenandoah and Hagerstown, Md., since last October, and on two cars of the Chicago, St. Paul, Minneapolis & Omaha. The Roanoke & Salem, the West End Street Railroad of Boston, and the Union Street Electric Railroad of Dover, N. H., seven miles long, also use the system. All the cars of the latter road are to be equipped with the heater. On the West End road it was found that the application of steam for four minutes kept the cars heated at a comfortable temperature for five hours in very cold weather.

THE SCRAP HEAP.

Notes.

A free bed has been established at the railroad hospital, at Altoona, Pa., in memory of Henry D. Minot, late President of the Eastern of Minnesota, $4,000 having been contributed for the purpose. Mr. Minot was killed in a collision on the Pennsylvania last November, and the $4,000 now given to the hospital was recovered from the railroad company by Mr. Minot's father.

The Merced (Cal.) *Star*, of recent date, says that the rails on five miles of track of the Southern Pacific near that place were lately so badly damaged that they had to be taken up, by the driving wheels of a very heavy dead engine. The item says that one of the driving wheels had a large flat spot, but it seems more likely that the trouble probably came from too high speed.

The yardmen of the Burlington & Missouri River struck last week, at Lincoln, Neb., in consequence of the discharge of a few of their number, and their action was followed by similar strikes at Omaha and Denver, but the company seems to have secured new men with very little trouble.

Alderman J. J. McBride, of Winnipeg, Man., has secured a patent in the United States for an observatory car, which is an ordinary sleeping car fitted up with structures something like a clear story, after the fashion followed in making freight cabooses. The plan is to have three of these, one at the middle and one at each end of the car, with seats facing the sides and ends. These seats are reached by a short flight of steps.

Foreign Notes.

It is stated that rich and readily accessible petroleum deposits were discovered some time ago on the east coast of Sumatra. After repeated unsuccessful attempts to secure the capital necessary to develop them, a company is said to have recently been formed in Holland, with a capital of 1,300,000 fl., to push the enterprise.

According to the regulations hitherto in force on the Prussian state railroads, smoking was permitted in the first-class passenger compartments, providing the consent of all the passengers in a particular compartment could be obtained, and providing, also, there was no special smoking compartment in the train. An order recently issued by the minister of public works, however, specifies that, hereafter, where there are two first-class compartments in a train, one of them is to be reserved for smokers, while in the other smoking is to be prohibited. Where a train has more than two first-class compartments, one-third of their number is to be reserved for smokers. In all the other first-class compartments smoking is to be prohibited even though there be no objection on the part of the ladies and other non-smoking occupants. When a train has only one first-class compartment the old rule is to remain in force.

According to German papers the city council of Vienna, Austria, has granted a franchise to an international compressed air and electrical company for laying underground mains for power distribution in the streets of the city.

Marseilles, France, has decided to adopt the overhead electric system for street car propulsion, and a new street car line, for which a franchise was recently obtained, will be built in accordance with it. The plant will be the first high tension electric installation of its kind in a large city in France.

The electric street car line at Buda-Pesth, in Hungary, to which reference has already been made in the *Railroad Gazette*, is said to be in great favor. Although the rates of fare are higher than on the horse car lines, the electric road receipts much exceed the receipts of the latter, being in the proportion of about 3 to 1. The total length of the line is about five miles, the speed maintained being about 12 miles per hour.

A street railroad, working on the Mackarski compressed air system, has been in operation in the city of Berne, Switzerland, since October, 1, 1890. It is about two miles long, and is worked by a 50 H. P. turbine plant. The maximum air pressure in the locomotive reservoirs amounts to 450 lbs. per square inch, and the time consumed in charging each reservoir is about 10 minutes. Within the city limits the speed is kept within about 7½ miles per hour, but outside of them a speed of 30 miles per hour is permitted.

A sectional, portable steamer for German Government service on the Victoria Nyanza is approaching completion at a Hamburg shipyard. It is 85 ft. 6 in. long, 16 ft. 8 in. wide, and will have a draught of 5 ft. 6 in. There are six distinct compartments, with a two-cylinder, high-pressure engine of 120 H. P.; a speed of 8½ knots per hour is expected, at which a fuel endurance of 72 hours is predicted. The total weight of the vessel, fully equipped, including duplicates of important parts, is stated to be 85 tons. The heaviest parts weigh 880 lbs. each. Of

these, however, there are only a few, the larger number ranging in weight between 60 and 125 lbs., and permitting, therefore, of easy transportation by carriers.

Railroad Law in Iowa.

Judge Wakefield has rendered a decision at Des Moines in the case of Carpenter against the Chicago, Milwaukee & St. Paul, in which he holds that that part of the Iowa law is unconstitutional which makes state commerce of freight shipments originating and ending in the state but passing through another. He holds that such shipments are interstate commerce. The Railroad Commissioners had held that such commerce was state commerce, as defined by the law, but pointed out that there might be some question as to the constitutionality of the provisions. The case will probably be appealed to the Supreme Court.

Judge Holmes has dismissed the case of the Railroad Commissioners against the Des Moines & Kansas City, which was brought to enforce their order requiring the road to maintain a station at Leslie, holding that there is no authority conferred upon the board by statute to make this requirement of railroads.

Commissioners' Report on Buffalo Collision.

In reporting on the collision on the New York, Lake Erie & Western, just east of East Buffalo, on Feb. 27 last, in which four employès were killed and three seriously injured, the New York Railroad Commissioners say that the accident was the result of a misplaced switch at the west end of the "Y" near East Buffalo, the same having been misplaced in some way unknown, and that had the switch been a safety switch, or had it been interlocked with distant signals as provided by statute, there would have been no accident. [It appears that one of the trains was derailed or thrown in the way of the other by a trailing stub switch.]

The Board finds that Engineer Diedrich, of the Lehigh Valley, was to blame in running at a higher rate of speed through the yard than prudence or specific rules permitted, and in permitting to ride upon his engine hostlers Ryan and Vader; and that Engineer Maloney, of Engine 233, was censurable in crossing on to the "Y" so near the time of the passage of Train 25.

Grade Crossings in Illinois.

There is a bill before the Illinois Legislature, which will probably become a law, providing that where one of the two roads using a grade crossing desires to put in interlocking signals and the other company will not come to an agreement, the first one may apply to the Railroad Commissioners, who shall, after proper notice and hearing, and examination of the grounds, issue an order prescribing proper interlocking equipment if they believe it is demanded by the public good. The Commissioners may also issue such orders on their own motion wherever they believe a crossing to be dangerous to the public or to trainmen; and they may specify the kind of machine to be used and all other particulars. They shall also apportion between the companies the cost of maintenance and operation. A new road must pay all the expense of maintenance and operation of interlocking signals at the crossing of an existing road, if such signals are ordered put in. Section 4 makes it the duty of the railroads to carry out the orders of the board within 90 days (unless the Commission extends the time) under penalty of $200 per week for neglect or refusal. After the signals for a crossing have been approved by the commissioners, they may permit trains to run over without stopping, under suitable regulations. The seventh section of the bill makes it apply to every "junction of two or more railroad tracks, whether the tracks joining each other are owned by the same or different companies," with a provision apparently intended to except switches and junctions not used by running tracks.

Marks' Artificial Limbs.

A. A. Marks, of 701 Broadway, New York, reports orders for artificial legs from Peru and other South American countries, Japan and Tasmania, as well as from all parts of the United States. The field being comparatively new and untried, Mr. Marks finds it necessary to make original investigations in his line of manufacture in all directions. He has experimented with the cane and bamboo of the tropics, the tupelo and cotton-wood of the South, the larch and cedars of the North, the willow of the East, and the lindens of the West. He finds his requirements most fully met by willow and bass, which are tough, light, homogeneous, and of minimum porosity. Mr. Marks has lately visited forests in Ohio to select linden (basswood) trees, and Northern Connecticut for yellow willow. He shipped home six car loads from Ohio, the lumber requiring two years' seasoning after being kiln dried.

Mr. Marks, who has made artificial limbs for 38 years, and controls a hundred patents, says he found success in breaking away from the old notion of imitating the natural limb in every feature; and the best features of his perfected limbs—of which the rubber hands and feet are perhaps the most novel—are the result of experiments along the line of scientific mechanics, and with the aim of reducing both first cost and cost of repairs. To produce an artificial hand which will perform its functions without noisy, heavy, and useless movements the maker must follow principles considerably different from those found in the natural limb, the resources used in the latter not being available for the human artificer. The rules for home measurement have been so thoroughly simplified that orders from a distance are constantly filled with great satisfaction.

The Pullman Shops at St. Louis.

The Pullman Palace Car Co. will rebuild its St. Louis shops on the city block bounded by Scott avenue on the south, Bernard street on the north, Cardinal avenue on the west, and Montrose on the east. Two-thirds of the next block north of Bernard street, with a frontage on Cardinal avenue, has also been bought. This purchase covers an area about four times greater than that occupied by the shops recently burned. The price paid aggregated $137,000. It is stated that fully 1,000 men will be employed in the new plant, which will soon be commenced and pushed to completion without delay.

Canal Lock at Sault Ste. Marie.

The Canadian Minister of Railroads and Canals has under consideration the question of asking parliament to vote an appropriation for the purpose of making a lock in the new canal at Sault Ste. Marie 100 ft. wide and 20 ft. deep. Within the last few years the tendency has been towards the construction of larger vessels on the lake, and it is thought that before actual masonry work on the lock has commenced Parliamentshou ld decide the question whether the depth should be 18 or 20 ft. The engineers of the department have presented reports to the minister on the subject.

Baku's Naphtha Industry.

Referring to the naphtha industry at Baku, and the proposed extension of the naphtha territory and the sinking of more wells, the Russian paper, *Kaspĭ*, gives particulars from a report of a commission, appointed some time ago, to examine into the matter. From this account it would appear that the increased number of bore-holes during the last two years has not given as much satisfaction as was expected. With the great increase in the number of wells, the item of repairs to casings, etc., has grown in a remarkable degree, with the natural result of an advanced price of naphtha. The swelling of the repair account is explained by the fact that the concentration of a large number of wells in the richer oil districts is causing an almost continual caving in of the ground, and consequently destruction of the well tubes, or casings. This circumstance alone, even ignoring the great fire risks coming from closely spaced oil wells, make the prospects for further successful well sinking in some of the districts exceedingly doubtful in the eyes of the commission.

Bound to be English.

English Lord (in American palace car).—"Fetch me a can of hot watah an' me rug."

Porter—"Dis car am heated by steam, sah."

English Lord—"Turn off the heat, an' fetch me a can of hot watah an' me rug."—*Exchange.*

LOCOMOTIVE BUILDING.

The West Virginia & Pittsburgh has ordered several locomotives from the Pittsburgh Locomotive Works, and probably others will be bought in the summer.

The Cooke Locomotive Works, of Paterson, is building five heavy passenger locomotives for the Central of New Jersey. The three which were ordered in February will be delivered in a few weeks.

CAR BUILDING.

Two private cars are under construction at the East Buffalo shops of the Wagner Palace Car Co. One of these is for Dr. W. Seward Webb, President of the Wagner Car Co., which will be finished in about 60 days, and the other is for Mr. George Vanderbilt and will be out of the shops by June 1. The company is now employing about 1,200 men in the various departments of the shops.

The Central of New Jersey has recently placed an order for 30 new passenger cars.

The Mount Vernon Car Mfg. Co., Mount Vernon, O., has recently received an order for 400 refrigerator cars for the Union Refrigerator Transit Co., of St. Louis. The company has also recently received an order for 200 box cars for a St. Louis line.

BRIDGE BUILDING.

Albany, Or.—The city council will probably purchase the ferry franchise across the Willamette River at Albany, and in that way remove all opposition to the immediate construction of the proposed free bridge.

Anne Arundel County, Md.—The commissioners of Anne Arundel and Prince George's counties Md., have awarded to the Phœnix Bridge Co. the contract for constructing an iron bridge over the Patuxent River between the counties, for $1,358.

Arthur, Tenn.—A proposition has been made by the King Iron Bridge & Mfg. Co., of Cleveland, Ohio, to build a bridge over Powell's River at Arthur, Tenn.

Baltimore County, Md.—A petition has been presented to the commissioners asking for the construction of a small bridge over Gwinn's Falls, in District 4, where it crosses Gwinn Brook avenue, and for a small bridge over Strievig's Run, on the same avenue.

Berry's Ford, Md.—The county commissioners have awarded the contract for building an iron bridge over the Middle Patuxent River, at Berry's Ford, sixth districts, to the King's Iron Bridge Co., of Cleveland, O., for $2,198.

Buena Vista, Va.—It is reported that the Columbus Bridge Co., of Columbus, Ohio, has received a contract from the Buena Vista Co. for constructing an iron bridge to connect Buena Vista with West Buena Vista. The length of this bridge will be 600 ft.

Burlington County, N. J.—The Atlantic and Burlington County Boards of Freeholders have awarded the contract for the new bridge over the Mullica River at Chestnut Neck to the Groton Bridge Co., of Groton, N. Y., for $28,945. The bridge will be 730 ft. long and have four spans and a draw. The plans were drawn by A. Lucius, of New York.

Chappell, Neb.—The town voted to issue bridge bonds for the building of a bridge across the North Platte River, near the town, at a recent election.

Delta, Col.—The contract to build two iron and wooden bridges over the Gunnison River has been let to the Bullen Bridge Co., of Trinidad, Col. One bridge will be over the north fork of the Gunnison River northeast of Delta, and the other will be across the main river at Delta. Each bridge is to cost $14,000.

Denver, Col.—The Denver, Apex & Western, a new road, proposes to construct a steel viaduct across the Platte River from Thirteenth avenue and South Fifth street to the Boulevard. It is stated that the structure will cost $100,000.

Fort McLeod, Can.—Heney & Smith, of Ottawa, have signed a contract with the Dominion government for the construction of a Howe truss bridge across the Old Man River at Fort McLeod, N. W. T. The estimated cost of the bridge is $30,000, and the construction is expected to occupy six months.

Fort Royal, Va.—Plans for the iron bridge to connect Fort Royal and Riverton, Va., have been decided on by the Fort Royal & Riverton Improvement Co. The bridge will probably cost $25,000 and will be about 1,300 ft. long.

Lampassas, Tex.—The Milwaukee Bridge & Iron Works, of Milwaukee, Wis., has the contract for the construction of the iron bridge across the Sulphur fork of the Lampassas River at Chestnut street. The bridge is to cost $8,000.

Little Rock, Ark.—The contract has been let by the County Court to the Missouri River Valley Bridge Co., of Leavenworth, Kan., for the free bridge across the Arkansas River at Main street, Little Rock. The contract price is $258,000. The bridge will be 1,700 ft. long, with a channel span 350 ft. long and two other spans of 300 ft. The design of the bridge is similar to that over the Mississippi River at St. Paul, built by the same contractors. There is much opposition in Little Rock to the bridge, and a temporary injunction has been secured to stop the work.

The contract for the construction of the bridge over the Arkansas River for the Little Rock Bridge & Terminal road is reported to have been awarded to the Union Bridge Co. for $320,000. The bridge will be situated in the eastern part of the city, connecting the Little Rock & Memphis and the Memphis, Little Rock & Pacific roads.

Maidstone, Vt.—The Maine Central has agreed to pay half the cost of a free bridge across the Connecticut River at Maidstone, if the towns of Brunswick and Maidstone in Vermont, and Stratford in New Hampshire, will pay the balance.

Marietta, Ga.—Bids will be received until May 2 by J. M. Stone, Marietta, Ga., for the erection of two bridges across Sopes Creek, one at Sorrell's Mill and the other on the Canton and Powers Ferry road. The length of the first bridge is to be 100 ft. and the second 120 ft.

Massachusetts.—A bill is before the Massachusetts Senate to authorize a public highway bridge across the reserved channel at South Boston, and connecting Eastern avenue with L street. The bridge plans are to be approved by the Harbor Commissioners, and upon the completion of the bridge before Aug. 1, 1892, 40 per cent. of the cost shall be reimbursed by the state to the city of Boston. Bills have also been reported from committees for highway bridges across Cohasset Narrows, between Wareham and Boune and across the Connecticut River between Holyoke and Chicopee.

McClintock, Pa.—The Western New York & Pennsylvania has sent out specifications for a new iron bridge, 300 ft. long, to be located at McClintock, near Oil City.

Minneapolis, Minn.—The estimates completed by the City Engineer for the proposed bridge at South Twentieth avenue, give the total cost as $178,295, divided as follows: Superstructure, $117,870; substructure, $59,000; grading, $1,425. There will be 1,245 ft. of roadway, and the bridge is to have a double track, with roadway and sidewalks.

Minnedosa, Man.—Tenders will be received by R. H. Myers, at Minnedosa, up to May 6, for the construction of an iron bridge over the river on Main street, in Minnedosa, according to the plans and specifications filed with the Department of Public Works at Winnipeg.

Minnesota.—Bills have been introduced at the present session of the state legislature authorizing the construction of the following bridges, appropriations being granted for most of the structures named: $2,000 for a bridge across the Sauk river and $3,500 for a bridge across the Crow river, both in Stearns county; for a bridge across the Minnesota river between Redwood and Renville county; for a bridge across the Crow river in Wadena county; $800 for a bridge across the Des Moines river in Cottonwood county, and for bridges in Itasca county, McLeod county and Olmstead county.

Napa, Cal.—The election to vote on the proposal to issue new bridge bonds will occur April 24. The plans for the bridge, which have been prepared, provide for a steel structure across the Napa River to cost $34,000.

New Haven, Conn.—The Commissioners of New Haven and Fairfield counties have let the contract for the new Housatonic bridge to the Berlin Iron Bridge Co., of East Berlin, for $54,000.

New York.—A large number of bills making appropriations for bridges in different parts of the state, principally over the Erie Canal, have come before the state legislature this session. Among the most important of these bridges which may be authorized are: An iron bridge over the Erie Canal and Tonawanda Creek at Tonawanda, to cost $35,000; a canal bridge at Ford street, Rochester, appropriation $18,000; Erie Canal bridge at George street, Cohoes, $12,000; over the Erie Canal at South Madison stree, Rome, $4,000; over the Erie Canal at Church street, Schenectady, $15,000; an iron lift or hoist bridge over the Erie Canal, at West Troy, near Nineteenth street, to replace the present structure, appropriation $14,000; over Rowe street, Rochester, to replace the present bridge with a lift or hoist bridge; to incorporate the Wolffe & Island Bridge Co., to erect a bridge across the St. Lawrence river from Cape St. Vincent to Kingston, Ont. The capital stock is $500,000, and the incorporators are: Thomas Brown of Wheatland, C. B. Hancock, Joseph M. Holmes, Henry B. Arden, and H. D. Kirkever.

Ottawa, Ont.—The Dominion government will receive tenders, addressed to the Secretary of Public Work, Ottawa, up to April 24, for constructing abutments and piers of an iron bridge to be built across the Rideau Canal, of Maria street, in Ottawa, in accordance with plans and specifications to be seen at the department of Public Works, Ottawa.

Peekskill, N. Y.—A bill is before the legislature transferring an unexpended balance of $27,000 from an old appropriation, to build a bridge over Annsville Creek to the State camp grounds.

Philadelphia.—The Philadelphia & Camden Elevated Bridge Co. was chartered in Pennsylvania this week to construct an elevated bridge over the Delaware River, between Camden and Philadelphia. The capital stock is $2,000,000. The incorporators are: Thomas S. Speakman, Arthur F. Thompson, Robert A. Parrish, Henry S. Markley and George W. Marter, of Philadelphia, and H. L. Bonsall, of Camden, N. J.

Phippsburg, Me.—P. O. Vickery, of Augusta, Me., has agreed to pay part of the expense of a bridge across Atkins Bay, at Phippsburg, near Bath, if the town will appropriate $7,500 toward the cost.

St. Paul, Minn.—The modified plans prepared by the city engineer for the Lake avenue viaduct in St. Paul have been accepted by the St. Paul & Duluth, and work will now be commenced on the structure soon.

Salem County, N. J.—The Berlin Bridge Co. has been awarded the contract to build the superstructure for an iron bridge over Salem Creek at Course's Landing, near Sharpstown. The contract is for $2,600.

Toledo, O.—The Toledo Bridge Co. has been incorporated in Ohio by James L. Houston, E. B. Smith, George P. Waldorf, L. E. Clark and E. W. Tolerten, all of Toledo. The capital stock is $100,000. Messrs. James L. Houston and E. B. Smith have been until recently connected with the Smith Co., of Toledo.

Trimble, O.—The Toledo & Ohio Central will probably build two new iron bridges over the Hocking River, one at Trimble and the other at Athens, O.

Utica, N. Y.—The State Engineer has prepared the plans for the proposed bridge at Schuyler street in Utica and the Superintendent of Public Works expects to let the contract and have the work well under way before the opening of navigation.

Winnipeg, Manitoba.—The city council has under consideration a proposal to build a new bridge across the Assiniboine River at Main street and that the present bridge be removed and re-erected at Armstrong Point, near Broadway.

Winona, Minn.—The new steel bridge being built over the Mississippi River at Winona will probably be ready for traffic next month. The total length of the structure will be 2,700 ft., the bridge proper being 1,300 ft. long. The cost will be $400,000. The bridge is being built by the Winona & Southwestern, the Green Bay, Winona & St. Paul and the Chicago, Burlington & Northern.

Yarmouth, Mass.—Proposals for building a bridge across Bass River, at South Yarmouth, Mass. (upon the site of the present structure), will be received at the office of Thacher T. Hallett, Yarmouthport, Mass., until April 25.

Youngstown, O.—The County Commissioners have decided to erect an overhead bridge crossing the tracks in the eastern part of the city. It will cost about $60,000 and the contract will be awarded in a few weeks. The bridge will cross the tracks of the Pennsylvania, the Pittsburgh & Lake Erie and the New York, Pennsylvania & Ohio, and these companies have each agreed to pay a portion of the expense.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulations of Railroads.

In New York the Court of Appeals decided, where a railroad is sold under foreclosure, and a new corporation acquires all of the properties of the old, except a leased line, which was not included in the property transferred, but of which, nevertheless, the new company actually takes possession and operates, the new company must be regarded as the assignee of the lease, and, by virtue of its possession, is liable for the rent, which, in this case was the interest on the first-mortgage bonds, which the original lessee had agreed to pay, and for which the succeeding company is liable as long as it occupies the road. But where the succeeding company notifies the lessor that it will not longer pay the rent (the interest), and the directors of the leased line agree not to charge rent if it will continue to operate the road, the operating company is not liable to the bondholders for interest after that time, as it is competent for the mortgagor (the lessor) and the lessee to modify the terms of the lease for the benefit of the assignee, whose only liability springs from possession, and who is in no privity with the mortgagees (the bondholders).[1]

In Alabama it is held by the Supreme Court that where a railroad permits third persons to place loaded cars on a spur track, negligence of the servants of such third persons in placing cars so near the main line as to cause a collision is the negligence of the company.[2]

In New York the Court of Appeals holds that a railroad which condemns a right of way under its charter, in the absence of special provision to the contrary, takes the land for perpetual use for railroad purposes; and when the company is consolidated with, and merged into, another company, which succeeds to all its rights and franchises, and continuously operates the road, the right of way does not determine and revert to the landowner at the end of the time for which the original company was chartered.[3]

In Virginia a railroad organized in 1848, and exempted by its charter from legislative regulation as to tolls until it should become able to pay dividends of more than 15 per cent.. on its capital stock, was acquired by by another company organized in 1870 under a charter investing it with all the rights and franchises of the first company, but containing a provision that it should be subject to all the laws applying to railroad companies generally. The Supreme Court of Appeals decides that the latter company and its successors were subject to the general act of 1853, prescribing certain maximum rates of toll, and a penalty for overcharges.[4]

In New York it is ruled by the Supreme Court that, where the charter of a railroad company provides that upon failure to commence or complete the road as therein provided, the company "is to forfeit the rights acquired by it under this act;" a cause of forfeiture does not *per se* divest the company of the franchise without suit brought for that purpose, and the company cannot be attacked for its default in condemnation proceedings instituted by it.[5]

In South Carolina the Supreme Court rules that a raiload is liable in exemplary damages for an injury caused by the recklessness of its lessee.[6]

In North Carolina the Supreme Court decides that, where a township has voted bonds in aid of a railroad to be constructed on a designated line, and subsequently the legislature enacts (Laws N. C. 1889, c. 557, §§ 1, 2) that the company "may" change its route, and that upon petition by the taxpayers of the township, an election shall be held on the question whether or not the bonds previously issued shall be used in aid of the construction of the new route, the county commissioners will be enjoined from ordering such election where it appears that the company has contracted for the construction of the road upon the original route, and is pushing the work to completion, as the company is not compelled to adopt the new route, and the election, therefore, would only depreciate the bonds without benefiting the township.[7]

In North Carolina the Supreme Court decides that a railroad company commits a tort, and becomes liable for punitive damages, in wilfully failing to stop for passengers at a regular station; and cannot escape liability on the ground that there was not sufficient room in the train, if it appears that by reasonable diligence it might have provided extra cars.[8]

Carriage of Goods and Injuries to Property.

In North Carolina the Supreme Court decides that an appeal in an action against a railroad company for failure to provide a car for the transportation of plaintiff's stock at the time stipulated in the contract, said appeal evidencing the plaintiff's intent to see the cattle at destination in another state on Sunday, cannot be dismissed on motion on the ground of statutory prohibition of Sunday sales in that state, but that evidence as to the state of the market and market price on that day in the state in which illegal sales were intended is not admissible to show the damage sustained by plaintiff on account of the railroad company's delay in transportation.[9]

In New Hampshire it is held that where the receipt given by an express company for goods delivered to it for shipment is taken from a book of blank receipts given by it to the shipper, and blanks therein are filled in writing by him, he is presumed to know all stipulations therein contained as to the company's liability for loss of or injury to the goods.[10]

In Nebraska the plaintiff applied to the agent of the R. I. & P. R. Co., at one of its stations, to ship a stove to K., on the line of defendant's road. The agent informed plaintiff that the custom was for shippers to release stoves, but advised him not to do it, but to pay the additional expense of sending it at carrier's risk. To this plaintiff assented, and offered to pay the freight to said agent, who informed him that he could as well pay it at the end of the route. The agent placed the goods in a car of a freight train. Some hours afterwards the agent handed him a paper, saying that it was a receipt for the goods shipped. This paper plaintiff put in his pocket, without examining it, and which proved to be a bill of lading of the goods, containing the condition, "stoves at owner's risk of breakage." The goods were received at C. B. from the R. I. & P. R. Co. by defendant railroad company, and carried to K. Upon arrival the stove was found to have been broken. Held, in an action against the defendant for damages for injury to stove, that the stove was carried at the railroad's risk.[11]

In the same state it is held that a snowstorm so violent as to prevent the moving of trains is the "act of God," and that a carrier of live stock is not an insurer against loss caused by the act of God, but, in such an emergency, he is required to bestow such care as an ordinarily prudent person or carrier would use under like circumstances, and if he fail to do so, and loss results therefrom, he is liable.[12]

In Iowa the Supreme Court holds that excessive charges paid to a common carrier, without knowledge that they are in excess of those charged other shippers, and in reliance on the representation of the carrier that all its charges are uniform, are not voluntary payments, and may therefore be recovered from the carrier.[13]

In Texas it is held by the Supreme Court that a railroad is liable in damages to the owner of a dog, which is killed while trespassing upon the track by the willful or intentional negligence of an engineer, or by his failure to exercise ordinary care and skill to prevent the injury.[14]

In Arkansas the Supreme Court decides that where a railroad employs a contractor to clear off and burn the rubbish from its right of way, the right of recovery against the railroad of one whose property is damaged from such fire is unaffected by the fact that the burning was carelessly done, but depends upon whether burning the rubbish was, under the circumstances, dangerous to the property of adjoining proprietors, even if carefully performed.[15]

In Missouri a railroad carried its track over a street under an ordinance requiring it to erect and maintain a suitable bridge, "so as to allow of the use of the full width of the street." The street was subsequently widened, the city taking property on each side from the railroad company for that purpose. The Supreme Court rules that the cost of reconstructing the bridge is an element of damage to be allowed the company in such proceedings.[16]

In New York it is held by the Supreme Court that an abutting owner is not deprived of his right to redress by erecting an awning extending from his buildings to an elevated railroad structure. especially where the railroad materially interferes with the light and air to the stories above the awning. Such action does not constitute an abandonment of the easements, and at most entitles the railroad company to the value of the support of the awning by its structure.[17]

Injuries to Passengers, Employes and Strangers.

In Alabama the Supreme Court holds that, for a passenger to allow his arm to protrude beyond the outer edge of the car window, is contributary negligence, which will bar his recovering for any injury caused thereby.[18]

In Dakota the plaintiff, having bought tickets of defendant railroad company for himself and family, pointed out to the baggage-master their baggage, consisting of three trunks and two boxes, and they were all checked except one box, a small, rough pine box, such as is used for merchandise. This box was not checked for the sole reason that it had no handle or place to which a check, could be fastened, but the agent received it, saying that he would place it in the baggage-car, and that it would go just as safe. Plaintiff made no misrepresentations, and was not asked as to the contents or value. For some reason it was not placed in the baggage-car, but was left behind on the platform, and afterward put in the baggage-room. That evening, the night baggage master, who knew that plaintiff intended to have the box go on the train with him, delivered it to one who falsely claimed to have authority to receive it, and at his request it was checked as baggage for him to a place other than that plaintiff had gone to. Held, that the railroad company was liable to plaintiff for the contents of the box.[19]

In Alabama some cars became uncoupled by the breaking of a defective link. In attempting to recouple them plaintiff sustained serious injuries. The Supreme Court rules that the defective link was the remote, and not the proximate, cause of the injury.[20]

In New York it appears that deceased had just entered defendant's machine-shops to learn that trade, and that he was ordered to aid in cleaning some water-pipes at a place where a trench was opened by the sectionmen so that the pipes could be reached. While disconnecting the pipes in the trench, the earth caved in and smothered deceased. The Court of Appeals rules, that it was the duty of defendant to furnish deceased a safe place in which to work, and that it was error to direct a non-suit on the ground either that deceased took the risk of the danger or that the sectionmen were his fellow-servants.[21]

In Georgia, a carpenter employed in the car department was injured while working at a saw in one of the shops. At the time of the injury he was making a hammer handle for an employé in another department, at such employé's request. Plaintiff's evidence was that it was usual to do such work without orders from the foreman of the carpenters; that the saw-table on which he was working was defective; that he did not discover the defect until after the injury; and that the company could have discovered it by a proper system of inspection. The Supreme Court decides that after three trials of the case, in each of which plaintiff had been successful, it was error to grant a new trial, on the ground that the evidence was insufficient to support a verdict in his favor, though defendant's evidence was to the effect that its carpenters were not authorized to make hammer handles for other employés and that the saw was not defective.[22]

In Utah the plaintiff alleged that defendant negligently attached to one of its cars a defective and dangerous brake, whose condition it might have known by the exercise of ordinary care, but which plantiff did not, and could not, have known in the course of his duties as brakeman; that, while he was performing such duties, this defective brake gave way, thereby throwing him to the ground, so that the wheels of the car ran over and crushed his hand. The Supreme Court holds that the complaint states a cause of action.[23]

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[1] Frank v. Erie & G. V. R. Co. (N. Y.), 25 N. E., 332.
[2] Georgia Pac. Ry. Co. v. Underwood, 8 South Rep., 116.
[3] Miner v. New York Cent. & H. R. R. Co., 25 N. E. Rep., 339.
[4] Norfolk & W. R. Co., v. Pendleton, 11 S. E. Rep., 1,062.
[5] In re Brooklyn El. R. Co., 11 N. N. Supp., 161.
[6] Hart v. C. C. & A. R. Co., 12 S. E. Rep., 9.
[7] Murfreesboro R. R. Co. et al. v. Commissioners of Hartford Co.
[8] Purcell v. Richmond & Danville R. Co.
[9] Waters v. R. & D. R.
[10] Durgin v. American Exp. Co. (N. H.), 20 A., 328.
[11] U. P. R. Co. v. Marston, 46 N. W. Rep., 485.
[12] Black v. Chicago B. & Q. R. Co., 46 N. W. Rep., 428.
[13] Cook v. Chicago, R. I. & P. Ry. Co., 46 N. W. Rep., 1080.
[14] St. Louis, A. & T. Ry. Co. v. Hanks, 14 S. W. Rep., 691.
[15] St. Louis, I. & M. & S. Ry. Co. v. Yonley, (Ark.) 14 S. W. Rep., 800.
[16] Kansas City v. Kansas City Belt Ry. Co., 14 S.W. Rep., 808.
[17] Mattlage v. New York El. R. Co., 11 N. S., 482.
[18] Geo. Pac. R. Co. v. Underwood, 8 South. Rep., 116.
[19] Waldron v. Chicago & N. W. R. Co., 46 N. W. Rep., 456.
[20] Pryor v. Louisville & N. R. Co., 8 South Rep., 55.
[21] Kranz v. L. I. R. Co., 25 N. E. Rep., 206.
[22] Harrigan v. S. F. & W. R. Co., 11 S. E. Rep., 965.
[23] Minter v. Union Pac. R. Co., 24 Pac. Rep., 911.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Central of New Jersey, quarterly, 1½ per cent., payab le May 1.

Nashville, Chattanooga & St. Louis, quarterly, 1¼ per cent., payable May 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Annapolis, Washington & Baltimore, annual, Baltimore, Md., May 4.

Atlantic City, annual, Camden, N. J., May 4.

Canada & Michigan Central Tunnel,, annual, Windsor, Ont., April 25.

Central of New Jersey, annual, Jersey City, N. J., May 8.

Central Ohio, annual, Columbus, O., April 29.

Cheshire, annual, Keene, N. H., May 13.

Chicago, Burlington & Quincy, annual, Chicago, Ill., May 20.

Chicago, St. Louis & Pittsburgh, annual, Indianapolis, Ind., April 15.

Cincinnati, Hamilton & Dayton, special, 200 West Fourth street, Cincinnati, O., April 27, to perfect a lease of the Cincinnati, Dayton & Ironton road.

Cincinnati, Saginaw & Mackinaw, annual, Saginaw, Mich., April 21.

Houston & Texas Central, annual, Houston, Tex., May 4.

Indianapolis, Decatur & Western, special, Indianapolis, Ind., April 23.

Junction, special, 22 Fifth avenue, Chicago, Ill., May 5, to act upon a proposed sale of the property and franchises to the Chicago & Northwestern.

Kansas & Arkansas Valley, annual, Little Rock, Ark., April 23.

Kansas City & Omaha, annual, Fairfield, Neb., May 5.

Lake Shore & Michigan Southern, annual, Cleveland, O., May 6.

Little Rock Junction, annual, Little Rock, Ark., April 23.

Little Rock & Fort Smith, annual, Little Rock, Ark., April 23.

Long Island, annual, Jamaica, N. Y., April 14.

Medicine Hat, special, Toronto, Ont., April 18.

Mexican Central, annual, Boston, Mass., May 6.

Michigan Central, annual, Detroit, Mich., May 7.

Mohawk Valley & Northern, special, Vanderbilt avenue and Forty-fourth street, New York City, April 29.

Norfolk & Western, annual, Roanoke, Va., May 6.

Ohio Southern, annual, Springfield, O., April 20.

Philadelphia & Reading Terminal, special, Philadelphia, Pa., April 21.

Pittsburgh & Western, annual, Allegheny, Pa., May 4.

St. Louis, Arkansas & Texas, annual, Texarkana, Tex., May 4.

St. Louis Southwestern (Missouri), special, Room 14, Equitable Building, St. Louis, Mo., April 21.

Union Pacific, annual, Ames Building, 1 Court street, Boston, Mass., April 29.

Utah Central, annual, Salt Lake City, Utah, May 4.

Railroad and Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Association of American Railway Accounting Officers* will hold its annual convention at the Southern Hotel, St. Louis, Mo., May 27, commencing at 10 o'clock a. m.

The *Master Car Builders' Association* will hold its annual convention at the Stockton Hotel, Cape May, N. J., commencing June 9, at 10 o'clock a. m.

The *New England Railroad Club* meets at its rooms in the United States Hotel, Beach street, Boston, on the second Wednesday of each month, except June, July and August.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month, except June, July and August, at the rooms of the Central Traffic Association in the Rookery Building, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, in the Gilsey House, New York City, at 2 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, the fourth Wednesday of January, March, May, September and November.

The *Northwest Railroad Club* meets on the first Saturday of each month, except June, July and August, in the St. Paul Union Station at 7:30 p. m.

The *Northwestern Track and Bridge Association* meets on the Friday following the second Wednesday of each month at 7:30 p. m. in the directors' room of the

St. Paul Union Station, except in the months of July and August.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month, at the House of the Society, 127 East Twenty-third street, New York. The annual convention will be held at Lookout Mountain, Tenn., commencing about May 30.

The *Boston Society of Civil Engineers* holds its regular meetings at the American House, Boston, at 7:30 p. m., on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at 78 La Salle street, Chicago, at 8 p. m., on the first Wednesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in the club's room, Laclede Building, corner Fourth and Olive streets, St. Louis, on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the House of the Club, 1 122 Girard street, Philadelphia, on the first and third Saturday of each month, excepting in January, when the annual meeting is held on the second Saturday of the month. The second January meeting is held on the third Saturday. The club stands adjourned during the months of July, August and September.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7:30 p. m., at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Cincinnati* holds its regular meetings at 8 p. m. on the third Thursday of each month in the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati.

The *Civil Engineers' Club of Cleveland* holds regular meetings on the second Tuesday of each month, at 8 p. m., in the Case Library Building, Cleveland. Semi-monthly meetings are held on the fourth Tuesday of the month.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo., on the second Monday in each month.

The *Engineering Association of the South* holds its monthly meetings on the second Thursdays at 8 p. m. The Association headquarters are at Nos. 63 and 64 Baxter Court, Nashville, Tenn.

The *Denver Society of Civil Engineers and Architects* holds regular meetings at 36 Jacobson Block, Denver, on the second and fourth Tuesday of each month, at 8 o'clock p. m., except during June, July and August, when they are held on the second Tuesday only.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7:30 p. m., on the third Saturday in each month.

The *Civil Engineers' Association of Kansas* holds regular meetings at Wichita on the second Wednesday of each month, at 7:30 p. m.

The *American Society of Swedish Engineers* holds meetings at the club house, 250 Union street, Brooklyn, N. Y. and at 347 North Ninth street, Philadelphia, on the first Saturday of each month.

The *Engineers' Club of Minneapolis* meets the first Thursday of each month in the Public Library Building, Minneapolis, Minn.

Association of American Railway Accounting Officers

The third annual meeting of this association will be held at the Southern Hotel, St. Louis, Mo., May 27, at 10 a. m. In addition to the regular business there will be reports of the Special Committee on Express Settlements, of the Committee of Conference with the American Association of General Passenger and Ticket Agents and the Special Committee on Nomenclature. Addresses will be read by W. K. Gillett, of the Atchison, Topeka & Santa Fe, on "Proper Checks for Auditing Daily and Monthly Reports of Local Passenger Traffic," and by E. R. Murphy, of the Denver & Rio Grande, on "Material Account—Proper Relation of Accounting Departments Thereto." An election will be held to fill the offices of president, first vice-president, second vice-president, secretary and four members of the executive committee for a term of two years, to replace the following retiring members: Messrs. Kelsey, Courtney, Douglas and Mink. An amendment to the constitution will be acted upon which changes the time of the annual meeting to the first Wednesday after the first Sunday in October of each year. Members desiring special rates at the Southern Hotel should address A. Douglas, Auditor of the St. Louis & San Francisco, St. Louis, two weeks in advance.

Rules of Interchange—New England Railroad Club.

At the meeting of Wednesday evening, April 8, 1891, President F. M. Twombly occupied the chair, and announced as the subject for discussion at the May meeting, "Rules for the Interchange of Freight Cars." The secretary read a letter from the Master Car Builders' Association requesting the club to offer suggestions with regard to changes of rules for interchange of freight cars, to be discussed at their annual convention. Mr. F. D. Adams moved that the secretary of the club be instructed to write to the Chairman of the Arbitration Committee, and state that the club had already made arrangements to discuss the rules for the interchange of freight cars at the May meeting, which would occur on the 13th of that month, and the club would comply with their request at that time, but could not do so earlier. This motion was carried. Mr. J. N. Lauder moved that a committee of three be appointed by the chair to consider this matter, and report at the May meeting such changes as they thought expedient in the said rules. This motion was carried, and the chairman appointed as such committee F. D. Adams, J. W. Marden and J. T. Chamberlain.

Western Railway Club.

The club will hold its next meeting on Tuesday, April 21 at 2 p. m. in its rooms, 850-54 Rookery Building, Chicago. The subjects for discussion are:

1. "Improvements in Locomotive Boiler Construction." The paper read by Mr. Hickey at the March meeting will be discussed.
2. "M. C. B. Interchange Rules." A supplementary report from the club committee on this subject will be discussed, and desirable alterations will be formulated for presentation to the M. C. B. Arbitration Committee.

PERSONAL.

—Mr. James L. Frazier, Superintendent of the Chesapeake, Ohio & Southwestern, is said to have resigned.

—Mr. J. H. Buckingham, Treasurer and General Manager of the Chicago Steel Works, died suddenly of heart disease at Lansing, Mich., last week.

—Mr. E. Marsh, Superintendent of the Birmingham, Sheffield & Tennesse River, has resigned. He was formerly Division Superintendent of the Louisville & Nashville at Birmingham.

Ex-Gov. Robert W. Waterman, of California, who died at San Diego, April 12, was interested in several roads in Southern California, and was President of the San Diego, Cuyamaca & Eastern.

—Captain Thomas H. Lapsley, who has been Superintendent of the Edgar Thomson rail mill continuously since the works were started, died at Braddock, Pa., last week. He was 72 years old.

—Dr. H. C. Potter, for many years Vice-President and General Manager of the Flint & Pere Marquette road, has resigned. It is reported that his successor will be Gen. J. M. Corse, recently Postmaster of Boston.

—Mr. Henry Read. Assistant Treasurer of the Grand Trunk, died at Montreal last week of pneumonia. He was 43 years old, and had been Assistant Treasurer of the Midland Railway before its consolidation with the Grand Trunk.

—Mr. Alfred H. Raynal, late General Superintendent of the Richmond Locomotive & Machine Works, has accepted the position of General Superintendent of the ship yard and iron works of S. L. Moore & Sons Co., of Elizabeth, N. J.

—Judge J. T. Portis, Consulting Attorney of the Missouri Pacific, will sever his connection on May 1 with the corporation, which he has served for nearly 18 years. Judge Portis was succeeded as General Attorney last fall by H. S. Priest, who resigned a like position on the Wabash.

—Mr. Thomas M. Holt, Lieutenant-Governor of North Carolina, and who becomes Governor of the state by the death of Governor Fowle, is President of the North Carolina road, a leased line of the Richmond & Danville, and is interested in other railroads in the South. His term as Governor will expire Jan. 1, 1893.

—Mr. Samuel Rea has resigned his position as Vice-President of the Maryland Central and Chief Engineer of the Baltimore Belt, owing to ill health. Mr. Rea accepted these offices in August, 1889, resigning from the Pennsylvania, being then Assistant to its Second Vice-President.

—Mr. John A. Dodson, who succeeds Mr. George R. Talcott as Superintendent of the South Carolina and Columbia & Greenville divisions of the Richmond & Danville, has been Superintendent of the Georgia, Carolina & Northern since it was purchased by the Seaboard & Roanoke. Captain Dodson was formerly Roadmaster of the Richmond & Danville, at Greensboro, N. C.

—Mr. Julius A. Gray, President of the Cape Fear & Yadkin Valley, died at his residence in Greensboro, N. C., April 14, of pneumonia, after a long illness. Mr. Gray was nearly 60 years old, and had been connected with various Southern railroads for the last 25 years. He was President of the Cape Fear & Yadkin Valley from 1879, and was a director of the Atlantic & North Carolina and other short roads in North Carolina.

—Mr. William F. Black, General Manager of the Louisville, New Albany & Chicago, resigned this week, and has been succeeded by Mr. William H. McDoel, who has been Traffic Manager since 1886. Mr. Black was formerly Superintendent of the Jefferson, Madison & Indianapolis. The office of Traffic Manager will be consolidated with that of General Manager.

—Mr. Edward D. Hayden, of Woburn, Mass., was this week elected Vice-President and Secretary of the Boston & Albany to succeed Mr. James A. Rumrill, of Springfield, who recently resigned. Mr. Hayden has served two terms in Congress, and is a lawyer by profession, but he has not practiced since 1862. He served through the civil war as Assistant Paymaster in the Navy, and has since been in the leather business at Woburn.

—Mr. J. Edward Larkin, Engineer in charge of the Philadelphia, Wilmington & Baltimore bridge across the Susquehanna River, between Havre de Grace and Perryville, died of acute bronchitis last Saturday morning, aged 60 years. He was born at South Yarmouth, Mass., and entered the service of the road with the late S. M. Felton. Mr. Larkin was for a time General Ticket Agent at Philadelphia, and subsequently became prominent as a bridge engineer.

—Mr. William H. Holcomb, Assistant General Manager of the Union Pacific, has resigned, and has been succeeded by Mr. Edward Dickinson, who is at present General Superintendent of the Trans-Ohio Division of the Baltimore & Ohio. Mr. Dickinson was formerly connected with the Union Pacific continuously for 18 years, resigning in June, 1890. He was then General Manager of the Missouri River Division and he had also been General Superintendent. Mr. Holcomb became Vice-President of the road in November, 1883, his title being changed last December, though he still remained as the chief executive officer at Omaha.

—Mr. William Moncure, at present Superintendent of the Durham & Northern and Palmetto roads in North Carolina, has been appointed Superintendent of the Carolina Central Division of the Seaboard & Roanoke. He succeeds Mr. T. W. Whisnant, who resigned some time ago. Mr. Moncure was graduated at the University of Virginia as civil engineer, and has since been engaged in railroad work. He was first connected with the Richmond & Danville, and subsequently accepted a position in the road department of the Raleigh & Augusta. He built the Palmetto and the Gibson branch of the Raleigh & Augusta, and in 1889, the Durham & Northern, of which he has since been Superintendent.

—Mr. J. E. Galbraith, Traffic Manager of the International & Great Northern, has been appointed General Freight and Passenger Agent of the road, the former position having been abolished. Mr. J. B. Bartholomew, the present General Freight and Passenger Agent, has been appointed Assistant General Freight Agent. Mr. Galbraith was formerly connected with the Missouri Pacific as Assistant General Freight Agent of the lines south of Texarkana, Tex. He became General Freight and Passenger Agent of the International & Great Northern when the lines were separated from the Missouri Pacific system and the road went into the control of the Receivers.

ELECTIONS AND APPOINTMENTS.

Arkansas Midland.—Major John J. Horner has been elected President of the company, vice Col. A. H. Johnson resigned on account of continued ill health. Col. Johnson has been made Vice-President.

Baltimore & Ohio.—P. C. Sneed has been appointed Superintendent of the Chicago division, to succeed F. H. Britton. Mr. Sneed was formerly Chief Clerk to the Superintendent of the division, and some years ago had a position with the company at Newark, O. R. W. Baxter has been confirmed as Superintendent of the Ohio & Midland divisions, with headquarters at Newark, O., to succeed George L. Jarvis.

C. C. Elwell has been appointed Division Engineer of Maintenance of Way of the Philadelphia Division, vice W. A. Pratt, transferred.

Bangor & Aroostook.—F. W. Cram, who was General Manager of the New Brunswick road until its purchase by the Canadian Pacific, is now General Manager of this new road, with office at Bangor, Me.

Boston & Albany.—The directors have elected Hon. E. D. Hayden, of Woburn, Mass., Vice-President, Secretary and Clerk of the board to succeed James A. Rumrill, who recently resigned.

Boulder Terminal.—Judge J. N. O'Neil, C. G. Buckingham, J. G. Cope, J. P. Maxwell, S. C. Brown, George S. Oliver, E. Morath and T. D. Owen, all of Boulder, Col., are the incorporators of the company.

Castle Valley.—The following are the directors named in the charter filed in Utah last week: B. W. Driggs, Jr., Alex. Johnson, B. F. Thornburg, Milando Pratt and E. M. Cummings, all of Salt Lake City.

Central Pacific.—The company elected the following directors last week: Leland Stanford, C. P. Huntington, C. F. Crocker, C. E. Bretherton, Timothy Hopkins, A. N. Towne, and E. H. Miller, Jr.

Chaudiere Valley.—The company has been chartered in Canada by John Breakey, George Breakey, Denaston Breakey and Harold Breakey, of Quebec, and William Breakey, of St. Jean Chrysostome, P. Que.

Chautauqua Lake.—Francis S. Jones has been appointed Superintendent of the road. Mr. Jones has been the General Freight Agent.

Chicago, Burlington & Quincy.—E. E. Pratt having resigned the office of Assistant Treasurer of the company, A. G. Stanwood has been appointed his successor. His office will be in Boston.

Chicago, Rock Island & Pacific.—C. M. Leonard, who has been Master Car Builder at Davenport, Ia., has been transferred to the shops at Chicago.

Cincinnati, Wabash & Michigan.—The stockholders, at their annual meeting at Elkhart, Ind., April 10, elected the following Board of Directors: J. D. Layng, M. E. Ingalls, E. T. Osborn, N. R. Johnson, Joseph Ramsey, Jr., J. C. Davis, H. P. Anderson, W. M. Greene, D. J. Mackey, George Bliss and John Newell.

Columbus, Shawnee & Hocking.—P. W. Huntington, of Columbus, is now President of this company, and succeeds D. S. Gray, who has resigned on account of his increased duties as General Agent of the Pennsylvania lines at Columbus, O.

Covington & Macon.—J. W. McCord has been appointed Roadmaster of the road. He was for 15 years in the roadmaster's department of the Georgia road, and for the last four years has been Supervisor on the Port Royal & Western Carolina road. His headquarters will be at Macon, Ga.

Dayton, Lebanon & Cincinnati.—The names of the incorporators of this company, chartered in Ohio last week, are as follows: G. B. Harman, W. P. Callahan, H. E. Talbot, H. E. Mead and George W. Houk. The principal office will be at Dayton, O.

Deadwood Central.—The officers of this company are now as follows: Joseph Swift, Wilmington, Del., President; E. Van Cise, Vice-President; A. W. Coe, Treasurer and Secretary; F. W. Shaw, Superintendent, and A. D. Wilson, Chief Engineer. The headquarters of the last four officers are at Deadwood, S. D.

Dunkirk, Allegheny Valley & Pittsburgh.—The following directors were re-elected at the annual meeting this week: Chauncey M. Depew, Cornelius Vanderbilt, William K. Vanderbilt, Frederick W. Vanderbilt, Edwin D. Worcester, Charles C. Clarke, Horace J. Hayden, Samuel F. Barger, H. Walter Webb, Dwight W. Pardee, Darwin Thayer, Oscar W. Johnson and Rasselas Brown.

East Side & Mount Vernon.—The following officers and directors were elected at a meeting held at 40 Wall street, New York City, April 13: President, David Cromwell; Vice-President, J. J. R. Croes; Secretary and Treasurer, A. E. Filley. Directors: L. R. Pomeroy, A. E. Filley, David Cromwell, Joseph S. Wood, L. E. Schmieder, F. S. Odell, David Quackenbush, F. D Fisher, and J. J. R. Croes.

Fort Worth & Denver City.—J. V. Goode, Trainmaster, has been appointed Superintendent of the company, with headquarters at Fort Worth, Tex.

Georgia Northern.—The incorporators of the company are: W. C. Tilton, Spring Place, Ga.; John G. Gould, New York City, and Henry G. Granger, Philadelphia.

Gulf, Colorado & Santa Fe.—J. H Dougherty, Master Mechanic, has resigned, and has been succeeded by J. Billingham, whose headquarters will be at Temple, Tex.

Hannibal & St. Joseph.—E. C. Post has been appointed General Agent of the freight and passenger department of this road and the Kansas City, St. Joseph & Council Bluffs, in place of E. E. Walker, assigned to other duties.

Iberia & Vermillion.—The company has been chartered in Louisiana by A. Erath, President; F. L. Gates, Vice-President; Dr. James A. Lee, Secretary, and E. A. Pharr, Treasurer, and Judge R. S. Perry, J. Davis, T. D. Foster, L. Trainor and George Simon, who are all directors.

International & Great Northern.—The office of Traffic Manager has been abolished, and J. E. Galbraith, who held that position, has been appointed General Freight and Passenger Agent, and J. B. Bartholomew is now Assistant General Freight and Passenger Agent.

Jefferson & Southeastern.—This company has been chartered in Texas by the following incorporators: J. H. Bemis, G. M. D. Grigsby, T. J. Rogers, R. C. Hawley, W. T. Atkins, W. B. Ward, John A. Kruse and S. A. Spellings, of Jefferson, Tex.; F. A. Whitney, J. H. Cunningham, E. B. Phillips, T. L. Nelson, Boston, Mass.; William Sturges, of New York, and P. J. Howard, of Chicago.

Kansas City Suburban Belt.—Frank M. Hill has been appointed Superintendent of the line, vice C. R. Barnhart, resigned. Mr. Hill will continue as General Super-

intendent of the Kansas City, Nevada & Fort Smith road, with office in Kansas City, Mo.

Kentucky Union.—James Phillips, Superintendent of Transportation of this company, and formerly Division Superintendent of the Gulf, Colorado & Santa Fe, has been appointed General Superintendent of the road, with headquarters at Lexington, Ky., to succeed Levi Hege, who has resigned. Mr. Hege was formerly Division Superintendent of the Central of Georgia.

Charles Scott has been appointed General Freight and Passenger Agent of the road, with office at Lexington, Ky., to fill the vacancy caused by the resignation of J. H. Murphy.

Kettle Falls & Columbia Valley.—The following directors have been elected by this company, chartered in Washington in January: William H. Reid, C. W. Bushnell, Charles H. Morgan, Henry D. Bushnell, Henry D. Quinby, Fred J. Casterline and Frank F. Madden. H. D. Bushnell has been elected President, W. H. Reid, Vice-President and Treasurer, H. D. Quinby, Secretary, and C. H. Morgan, Chief Engineer and Manager.

Long Island.—At the annual meeting of the stockholders of the company, held at Jamaica, N. Y., April 14, the following directors were elected: Austin Corbin, Charles Pratt, Charles M. Pratt, J. G. K. Duer, William B. Kendall, George S. Edgell, Benjamin Norton, Daniel Lord, F. L. White, J. P. Townsend, W. G. Wheeler, J. D. Campbell, E. R. Reynolds. The new directors are Charles M. Pratt, Benjamin Norton, F. L. White and E. R. Reynolds, who take the places of Henry Graves, J. R. Maxwell, H. W. Maxwell and Edward Tuck. The directors have organized as follows: Austin Corbin President; Charles Pratt, First Vice-President; Benjamin Norton, Second Vice-President; George S. Edgell, Treasurer. The changes in the Board from that of last year are the retirement of J. R. Maxwell as First Vice-President and Henry Graves as Treasurer.

McKeesport Connecting.—George N. Riley is now Master Mechanic of the road, with headquarters at McKeesport, Pa.

Milwaukee, Lake Shore & Western.—Robert Quayle, who has been for the last four or five years Master Mechanic of the Chicago & Northwestern, at Clinton, Ia., has been appointed Master Mechanic of this road.

New Orleans, Fort Jackson & Grand Isle.—At a meeting of the stockholders, held in New Orleans last week, the following board of directors was elected: Henry C. Warmoth, George Anderton, Anglo Socola, Thos. Pickles, Joseph H. Hinson, W. S. Reddick, H. T. Herwig.

New Orleans, Spanish Fort & Lake.—The following directors were elected at the recent annual meeting in New Orleans: Charles Schiff, Jules Aldige, Henry H. Hall, Alford Slidell and John Glynn, Jr. The board elected the following officers: Charles Schiff, President; John Glynn, Jr., Secretary and Treasurer, and A. Clark, Superintendent and Manager.

New York Central & Hudson River.—At the annual meeting of the stockholders of the company in Albany, N. Y., April 15, the following were elected directors: Cornelius Vanderbilt, Chauncey M. Depew, Charles C Clarke, Horace J. Hayden, William K. Vanderbilt, Frederick W. Vanderbilt, Samuel F. Barger, J. Pierrepont Morgan, Cyrus W. Field, all of New York; William Bliss, Boston; Sherman S. Jewett, Buffalo; Erastus Corning, Albany and George C. Buell, Rochester.

Ontario & Sault Ste. Marie.—At the annual meeting in Montreal, Que., directors were elected as follows: L. J. Seargeant, Edmund Wragge, R. Jaffray, G. A. Cox, H. M. Baird, John Bell, J. M. Ferris, D. Bergin and Kenneth Chisholm. The board elected L. J. Seargeant President and Edmund Wragge Vice-President.

Panama.—The annual meeting of the stockholders of the company was held in New York last week. The old Board of Directors was re-elected and the following officers: President, John Newton; Vice-President, Charles Coudert; Secretary and Treasurer, Ernest L. Oppenheim; and General Superintendent, A. L. Rives, with office at Aspinwall.

Pecos Valley.—The office of Superintendent of Transportation having been abolished, W. H. Vaughan will hereafter have charge of trains and the distribution of cars, with headquarters at Pecos, Tex.

Pennsylvania.—Charles F. Beckdolt, Assistant Engineer of the New York Division, has been appointed Superintendent of the Central Division, with office at Media, Pa. He succeeds R. L. Holliday, who was recently transferred to the Delaware Division, with office at Clayton, Md.

J. H. Nichols, for many years Supervisor of the West Jersey road, has been appointed Assistant Engineer of the West Jersey and Camden & Atlantic, vice Samuel C. McComb, deceased.

Port Angeles & Southern.—The directors of this newly chartered company have elected these officers: Capt. F. S. de Wolfe, Seattle, Wash., President; Lauren Ingels, Seattle, Vice-President; N. M. Singleton, Seattle, Secretary, and C. E. Mallett, Port Angeles, Wash., General Manager.

Richmond & Danville.—John A. Dodson has been appointed Superintendent of the South Carolina and Columbia & Greenville Divisions, to fill the vacancy caused by the resignation of G. R. Talcott.

Rogue River Valley.—The following are the officers operating this new Oregon road: W. Honeyman, Portland, Ore., President; W. A. Buchanan, Portland, Or., Secretary; E. W. De Hart, Portland, General Freight and Passenger Agent, and J. S. Howard, Medford, Or., Chief Engineer.

Seattle, Lake Shore & Eastern.—Harry R. Talcott, Chief Engineer of the Seattle & Eastern Construction Co., has been chosen Managing Trustee of the railroad company, to act during the leave of absence of President A. S. Dunham.

Sinaloa & Durango.—At the recent annual meeting the present Board of Directors was re-elected.

Southern Pacific.—At the annual election of the company, held in San Francisco April 8, the old Board of Directors was re-elected as follows: C. P. Huntington, Leland Stanford, Col. Charles F. Crocker, L. T. Gage, A. N. Towne, J. C. Stubbs, W. E. Brown, W. V. Huntington, E. H. Miller, Thomas E. Stillman and Thomas H. Hubbard. The directors chose the following officers: C. P. Huntington, President; C. F. Crocker, First Vice-President; A. N. Towne, Second Vice-President; J. C. Stubbs, Third Vice-President; Timothy Hopkins, Treasurer; M. A. Lansing, Secretary and Controller.

Sumpter Valley.—David Eccles is President of this Oregon road and Charles Nibley is Vice-President. Joseph A. West is Secretary and Treasurer and also Chief Engineer. The office of the company is at Baker City, Or.

Taylor, Bastrop & Houston.—The stockholders of the company held their annual meeting last week at Houston, Tex.; the following directors were elected: W. D. Cleveland, A. P. Root, Eugene Pillot and George W. Gaines, Houston; L. Fitzgerald, F. P. Olcott and Charles F. Beach, Jr., New York. The directors elected W. D. Cleveland, President; E. Pillot, Vice-President, and George W. Gaines, Secretary and Treasurer.

Tennessee Coal Iron & Railroad.—The Board of Directors of the company who were chosen April 7, at Tracy City, Tenn., met in New York April 15, and the following officers were elected: President, Thomas C. Platt; Vice-Presidents, N. Baxter, Jr., Nashville, Tenn.; T. T. Hillman, Birmingham, Ala., and A. M. Shook, Tracy City, Tenn.; Secretary and Treasurer, James Bowron; General Manager, A. M. Shook.

Toledo & Ohio Central.—H. Brinkley has been appointed Assistant Engineer, with headquarters at Bucyrus, O.

Trinity & Sabine.—At a meeting of the stockholders, held at Trinity, Tex., April 7, the following were elected officers: R. B. Baer, President; T. J. Boyles, Vice-President; S. H. Park, Secretary and Treasurer; C. J. Pickering, Assistant Secretary. Directors: R. B. Baer, A. S. Hall, D. M. Angle, T. J. Boyles, F. P. Alcott, Louis Fitzgerald and Charles F. Beach, Jr.

Trunk Line Association.—The general offices of the Trunk Line Association will be located in the new building of the Central Railroad Co., of New Jersey, 143 Liberty street, New York, after April 20.

Unadilla Valley.—At a special meeting in the company's offices, No. 80 Broadway, New York City, April 15, the following directors were elected: Ralph Brandreth, Russell H. Hoadley, George H. Scott, Frederick F. Culver, R. Floyd Clarke, Benjamin Wright and Charles D. Ingersoll.

Union Pacific.—A. H. Crocker, Superintendent of the Pacific Division, has resigned, and Edward Conkingham, Assistant Superintendent, has been promoted to succeed him, with office at Portland, Ore.

The general offices of the Mountain Division, including the office of W. H. Bancroft, General Superintendent, have been removed from Salt Lake City to Ogden, Utah.

West Shore.—The annual meeting of the company was held in Albany, N. Y., April 15, at which the following directors were elected, no change being made from last year: Cornelius Vanderbilt, William K. Vanderbilt, Frederick W. Vanderbilt, C. M. Depew, Ashbel Green, J. Pierpont Morgan, Charles C. Clarke, Edward D. Adams, Horace J. Hayden, Samuel F. Barger, J. Hood Wright, Charles Lanier and Charles Edward Tracy.

Winona & Southwestern.—C. R. Capron has been appointed General Freight and Passenger Agent, with office at Winona, Minn. He succeeds E. G. Hornbrooke, who has been appointed Auditor and Cashier.

Wisconsin Central.—At a meeting of the Board of Directors of the company held last week, R. G. Hazard, of Peace Dale, R. I., was elected a director in place of J. H. Wellman.

RAILROAD CONSTRUCTION,
Incorporations, Surveys, Etc.

Alliance & Northern.—The company filed articles of incorporation in Ohio April 9, the capital stock being $500,000. The road is to extend from Alliance northeast through Stark, Mahoning, Portage and Trumbull counties to Southington, a distance of about 30 miles. It is stated that the directors propose to purchase the Lake Erie, Alliance & Southern, which was sold at foreclosure last June. The incorporators of the new company are Harvey H. Brown, E. H. Bourne, Andrew Squire, J. H. Dempsey and D. B. Chambers.

Boston & Maine.—A petition signed by the directors of the road was filed in the Supreme Court in Concord, N. H., April 13, asking for authority to extend the Concord & Claremont road, which it operates under lease from the Northern Railroad, from Henniker to connect with the track of the Manchester & North Weare, at North Weare, N. H., six miles.

Boulder Terminal.—A charter was filed in Colorado by this company April 11. It is proposed to build a road from Boulder to Denver, with branches to Ward and Lyons. The engineers will commence the surveys for the main line between Denver and Boulder next month. The capital stock is $200,000.

British Columbia.—Applications have been made to the British Columbia legislature for a charter to build a road from Nanaimo to the north end of Vancouver Island, and for a road to a point on the Straits of Fuca.

Canadian Pacific.—A cash subsidy of $150,000 has been granted the company by the Manitoba government to build an extension to the Souris coal fields, a little beyond the western boundary of the province, and also to extend two other branches in the province. The subsidy is for the line which the Northern Pacific & Manitoba proposed to construct but has not completed.

Central.—The company filed articles of incorporation in Colorado, April 8, to build a line from Coal Creek station on the Burlington & Missouri River road, to Boulder, Col. The right of way has been partly secured and the new line is said to be a branch of the Burlington & Missouri River road.

Chattanooga Southern.—The tunnel at Pigeon Mountain, near Kensington, Ga., is expected to be finished and ready for the trains to run through early in June. There is said to be about 15 miles of track between Yellow Creek and Little River, which has not yet been laid, but the company expects to run through trains from Chattanooga south to Gadsden, Ala., 98 miles, by June 15.

Chaudiere Valley.—A provincial charter has been granted this company for a road to be constructed from a connection with the projected St. Lawrence bridge near the town of Levis, then up Chaudiere River to Scott's Junction, to connect with the Quebec Central. Also to run steamboats on the River Chaudiere, between Scott's Junction and Jersey Point, in Saint Georges. Six miles of road on the Chaudiere River, now operated by John Breaky, of Quebec, will be merged with the new road.

Chesapeake & Ohio.—The track upon the Craig mineral branch is being laid very rapidly, and about seven miles of the track has been completed laid Eagle Rock, near which the connection with the Chesapeake & Ohio is made. The grading has been finished to near Newcastle, and the contractors will finish their work on the entire 27 miles of road early in the summer.

Chicago, St. Paul, Minneapolis & Omaha.—The Marshfield branch was completed last year from Merillan northwest to Marshfield, Wis., on the Wisconsin Central, but the line was not opened for traffic until this month. It is 23 miles long, the stations being Cedarhurst, Granton, Aix and Merillan.

Cleveland, Wooster & Western.—Ryan & McDonald, of Baltimore, have commenced the grading on the old roadbed between Lodi and Wooster, O., about 20 miles. The track will probably be laid in three months, as there will be little grading, the route following a partially built road. The line will be a branch of the Akron & Chicago Junction, with which it connects at Lodi, its northern terminus.

Columbia, Newberry & Laurens.—The extension from Newberry northwest to Clinton, S. C., on the Georgia, Carolina & Northern which was compleed early this year, has been put in operation. The extension is about 21 miles long, the terminus of the line now being 64 miles from Columbia. The road is now being operated by the South Carolina.

Concord & Montreal.—The company has about 150 men laying the track on the Manchester & North Weare, between North Weare and Henniker, on the Boston & Maine. The extension is about 6¼ miles long and the track on the first three miles in Henniker township has been laid in the last few weeks. No grading has been necessary, as the rails are being relaid on an old roadbed abandoned 30 years ago. The work is light, and there are no bridges to be built. The track is being laid by the company's men. The company also proposes to relay the rails between Suncook and Candia on the Concord and Portsmouth branch. This road was formerly constructed from Portsmouth to Concord via Suncock. Later on a line was built from Candia to Manchester, and the rails were then taken up between Candia and Suncook.

Deadwood Central.—Since the beginning of the year the company has laid about six miles of track on its line between Deadwood and Bald Mountain, S. D. This leaves about eight miles of the line still unfinished, and the company has a small force engaged on the construction work. Trains will be running on the 14 miles early this summer, but most of the work will be completed this month. The present line in operation extends from Deadwood to Lead City, three miles. Surveys have been made for two other lines—one from Deadwood to Gelena, S. D., a distance of 11 miles, and the second from Deadwood to Carbonate, S. D., 10 miles. These lines have not yet been finally located, and it has not yet been decided when the contracts to build them will be let.

Ebensburg & Cresson.—This road is to be sold at foreclosure in Cambria County, Pa., May 8. It is about 11 miles long, extending from Ebensburg to Cresson, and has been operated by the Pennsylvania. The foreclosure sale is to give that company full possession of the property. It is reported that several branches are to be built, one from Kaylor, north for about 30 miles to Brubaker's Run, and another from a point on this line to Elder township.

Exeter & Amesbury.—The charter for the extension to Amesbury, Mass., has been favorably reported upon to the Massachusetts State Legislature by the railroad committee. The extension for which the chater is asked is for a line from the present terminus of the Exeter road at the New Hampshire state line, near Exeter, N. H., south to a connection with the Boston & Maine at Amesbury. Authority is given to consolidate with the Exeter road. The capital stock is $100,000, and Richard F. Briggs and others are incorporators.

Fidalgo City & Anacortes.—Local papers state that the line was opened for traffic last week, although a good deal of work still remains to be done. The track was laid last December from Fidalgo City, on Deception Pass, along the east side of Fidalgo Island to Anacortes, Wash., on the north side, a distance of 11 miles. The road is to be operated as a freight and passenger line, but only the freight will be hauled by steam locomotives, electric motors being used for passenger traffic.

Fincastle & Troutville.—The Roanoke & Botetourt Construction Co., which was organized earlier in the spring to build this road, has let the work this month to subcontractors, and it is expected that the grading will soon begin at Fincastle. The road is to extend south to Troutville, Va., on the Shenandoah Valley line, a distance of about seven miles.

Fremont, Elkhorn & Missouri Valley.—The contract for the extension of 100 miles recently let to Corey Bros., and mentioned last week, is said to be for work on the Great Northern instead of on this road.

Georgetown & Granger.—Surveys have recently been made by the engineers of the Missouri, Kansas & Texas from Georgetown south to McNeill, Tex., and to Austin. A second survey is being made between these points via Round Rock. The surveys were made last fall from the connection with the Missouri, Kansas & Texas at Granger southwest to Georgetown, about 10 miles. A company has been organized to grade that portion of the line, and it is now proposed that the rails be laid by the Missouri, Kansas & Texas, and an extension built to McNeill, by which that road could obtain a line to Austin using the tracks of the Austin & Northwestern from McNeil.

Georgia Northern.—The application of this company for incorporation in Georgia has been recently noted. The route of the road is to be from Dalton or Cohutta Junction, on the East Tennessee, Virginia & Georgia, in the northwest part of the State, southeast through Spring Place and Talking Rock, to Ball Ground, in Cherokee County, on the Marietta & North Georgia. The distance is about 55 miles. There will be no heavy grades on the line, the route following valleys the entire distance. The road is projected to reach large mineral lands, now without railroad facilities, and which the owners propose to develop. The projectors expect to secure the capital to build the road in New York shortly. Large bodies of black marble are to be found along the route, except on the first eight miles from Dalton. Besides marble, good qualities of talc, manganese, and brown, hematite and magnetic ore in beds from 3 to 16 ft. wide, which is said to be suitable for Bessemer steel, are found.

Glasgow Belt.—Lair & O'Brien, of Roanoke, Va., have been awarded a subcontract on the line in Arnolds Valley, near Glasgow, Va. E. D. Swift also has a con-

tract for six miles. The grading will be commenced at Glasgow immediately. The road is being built by the Rockbridge Co., and the engineers of the company are still at work on the locating survey up Arnolds Valley. The road will be built up Arnolds Valley to a connection with the Shenandoah Valley road, and that company's bridge across the river will be used temporarily until a new bridge has been erected.

Haines, Hamilton & Kingston.—The United States Investment Co., of St. Louis, has secured the control of this company recently, and it is said that the grading will begin this year on an extension north from Hamilton to Gallatin, on the Chicago, Rock Island & Pacific, about 10 miles. Other extensions north to Cainsville, and from Kingston south to the Missouri River are also said to be proposed. The road was transferred to the United States Investment Co. by Haines Bros., who have been operating the line since they completed it last summer.

Iberia & Vermillion.—The charter of this company was filed in Louisana last week. The capital stock is $300,000 and the company has been organized to build a road from New Iberia, on the Southern Pacific, west about 15 miles to Abbeville. On May 12, an election will be held in New Iberia to vote on a proposed special tax to aid in the construction of the line.

Kansas City, Nevada & Ft. Smith.—Right of way is being secured for the extension to Independence, and the officers of the company state that they will begin the construction of the line as soon as the land has been obtained. The company has sold about $150,000 of its bonds to build the extension, and it is claimed that this amount, with the subsidies voted by the towns, will be sufficient to complete the work. The extension from Amoret, Mo., will probably pass through Fort Scott, Kan., although this route may be changed before the grading begins. The company will soon apply for a charter in Kansas for the portion of the new line in that State.

Kings County Elevated.—The Brooklyn & Jamaica Bay, a surface road about nine and a half miles long, extending from Flatbush avenue, Brooklyn, to Jamaica Bay, N. Y., is said to have been sold to this company, which proposes to build an incline from its elevated structure to reach the track. The Brooklyn & Jamaica Bay is a leased road of the Long Island, but is not now operated by that company.

Louisville & Nashville.—The Cumberland Valley branch was opened for traffic this week as far as Big Stone Gap, Va., and passenger trains began running April 14. The extension begins at Corbin, on the Knoxville branch, and the track has been laid to within a few miles of Norton, Va. The distance in operation is about 61 miles.

Mexican Northern.—The road is now being operated from its connection with the Mexican Central at Escalon, Mex., north to Rincon, a distance of about 65 miles. The track has been laid for about 20 miles beyond this temporary terminus to near Sierra Mojada, and the trains will probably be running on the entire line near Glenwood next month.

Mexican Southern.—The grading is practically finished on the second section of the line from Tehuacan to Tecomavaca, Mex., 60 miles, and the rails have been laid on a considerable portion of the line to a point beyond San Antonia, nearly 130 miles south of Puebla, the northern terminus. The first division to Tehuacan, 80 miles, is in operation, and as soon as the track has been laid through the tunnel north of Tecomavaca trains will begin running to that town. This will probably be early in May. Charles Thornton, who is one of the principal sub-contractors under Read & Campbell, states that about 1,500 men are working south of Tecomavaca to Oaxaca. This section is 90 miles long and completes the road, Oaxaca being the southern terminus.

Midland (Indiana).—The engineers who have been surveying the line for the Southern extension completed the surveys to Brazil, Ind., last week. The officers state that the construction work on the section will begin next week, and that they expect to have the line in operation from Brazil, 15 miles from the present line, by Aug. 1.

Mississippi River & Bonne Terre.—The company has asked for bids for the grading on the proposed extension from Bonne Terre, south to Doe Run, Mo., a distance of about 15 miles. The surveys have been made and most of the right of way secured.

Mohawk Valley & Northern.—John W. Westbrook, 22 William street, New York City, who has the contract for the northern extension of the Herkimer, Neport & Poland, which has been merged in this company, will let the sub-contracts in a few days for building 40 miles of the northern division south from the Central Vermont at Malone, N. Y., via Paul Smith's. On the southern section north from Poland the principal sub-contractors are J. M. Sullivan, of Portchester, N. Y., and Brady Bros., of Bergen, N. J. The surveyors have been in the field for some time on the extension through the Adirondack woods, and several lines have been surveyed, but the company has not yet definitely adopted any of the routes, and the only part located is a small section from Poland. For that reason the contractors have only a small force of men employed. The road will probably be built directly north from Poland for a short distance, passing through Hinckley's (Gang) Mills and Prospect along West Canada Creek, where a retaining wall two miles long will be built, and perhaps also to Remsen; thence northwesterly, crossing the Black River near Twin Lake and to the Forge House at the foot of the Fulton Chain and to Tupper Lake, Saranac Lake and through Franklin County to Malone. Near Tupper Lake a connection will be made with the Northern Adirondack. The route outlined has not been decided upon, and the line may be entirely changed when the locating surveys are made. The company will lay 75 lb. rails. The road has generally been regarded as controlled by the New York Central, but an executive officer of that company writes that it is an independent project, and that the Central has no connection with it. E. M. Barns, of Herkimer, is General Manager.

Nashville, Chattanooga & St. Louis.—Surveys have been made this month from Huntsville, Ala., south to the Tennessee River, near Whitesburg, about 10 miles. The survey follows the proposed route of the Tennessee & Coosa, but a new line was also surveyed from a point six miles south of Huntsville to the river, which avoids a large amount of trestling required on the first line. The engineers expect to reach Huntsville in about two weeks, but will probably follow for the most part the surveys which have already been made. The grading on that part of the extension south of the Tennessee River has progressed rapidly during the recent dry weather, and the last six miles to Guntersville will be ready for operation by June 1.

New Albany Belt & Terminal.—The balance of the work on this line will be completed in a few weeks, and the company expects to have the road in operation by May 1. When it is finished it will be transferred to the Kentucky & Indiana Bridge Co. for operation. The road connects with the north end of the bridge and extends to New Albany, Ind., 10 miles. About a quarter of a mile of track is still to be laid.

New Hampshire.—The legislature has passed bills granting special charters to the Suncook Valley and the Glen Ellis roads, and extending the charter of the title for Franconia.

New Roads.—The Board of Trade of San Jose, Cal., is securing right of way for a proposed road from San Jose north to deep water at Alviso, on San Francisco Bay. The line is about 20 miles long, and is built to shorten the distance by the present line of the Southern Pacific. About $75,000 have been subscribed by members of the Board of Trade to build the line, and it is expected that $50,000 additional can be secured.

About five miles of the line from Branchville, S. C., on the South Carolina road southwest to Hampton, are in operation, and the contractors, Mauldin & Son, are grading the balance of the 30 miles to Hampton, near the Savannah River.

John McMakin has recently completed a reconnoissance for a projected road from Jalapa, Mex., on the Interoceanic, north to Misantla, a distance of about 40 miles.

Norfolk & Western.—The track on the Clinch Valley extension has been laid to within three miles of Norton, Va., the terminus. The work has been delayed during the past few months by the wet weather, but it is expected that the extension will be finished to Norton next week, and that the connection with the Louisville & Nashville at that point will be made early in May. On the Cumberland Valley extension of the latter road the track is laid to within 10 miles of Norton.

Northern Pacific.—Griggs & Huestis, of Tacoma, Wash., the contractors on the Yakima & South Coast branch, have about 500 men employed on the grading to the Pacific Coast. About three miles of track has been laid this year, but the work has only recently been resumed, as the winter rains have kept the ground very damp. The character of the work has been in general, light, but the clearing to be done has been heavy. There is considerable rock work and timber on the mountain section. The branch is 56 miles in length between the terminals, Chehalis and South Bend, Wash. The route is as follows: Beginning at Chehalis, a station on the Pacific division of the Northern Pacific, and following the valley of the Chehalis River to the mouth of Rock Creek; thence to the summit of the Coast Range; thence down a small tributary to the valley of the Willapa River, and to South Bend, on Willapa Harbor. The maimum grades on the line are 95 ft. per mile, and the maximum curvature is 10 degrees. E. H. McHenry, Principal Assistant Engineer of the Northern Pacific has charge of the work.

It is reported that the Tacoma, Olympia & Gray's Harbor line, which has been recently placed in operation between Centralia and Ocosta, Wash., is to be extended at once to Aberdeen, Hoquim and Gray's Harbor, the road to be completed by Aug. 1. The work is to be pushed rapidly to secure the very large subsidies voted to the Oregon & Washington Territory road for the line.

The contractors on the Lake Washington Belt line are to lay the rails on the four miles from Kirkland, north to Derby, Wash., on the Seattle, Lake Shore & Eastern within 30 days. The grading has been finished except in a few places. South of Kirkland the road is well under way and J. G. McLean & Co., the contractors, are working near Houghton. The work there is very heavy and requires much blasting. The long trestle near the Blackwell farm is being rapidly built. It is nearly 100 ft. high. Another trestle, about 50 ft. high, will be built across a gulch about one-eighth of a mile north of it. With the exception of the work now in progress at Mercer slough, the grade is practically ready for the rails as far south as Colman, but from that town the right of way is in litigation in the supreme court. Track has been laid between Kirkland and Black River Junction. To cross Mercer slough it has been necessary to construct a raft of logs and brush across the marsh.

Pennsylvania.—Surveys have been begun recently for a branch of the Schuylkill Valley from Roxborough Station, near Philadelphia, through Roxborough on a route parallel to Ridge Avenue and across to Chestnut Hill. Nearly all the persons owning property along the line of the proposed branch have granted the company the right of way.

Prescott & Northwestern.—The company is completing its line from Prescott through Nevada, Hempstead and Pike counties, Ark., and about seven miles of track have been laid from Prescott. R. L. Powers, of Prescott, is President.

Quincy Electric Freight.—A bill has been introduced in the House of Representatives in Massachusetts to incorporate this company, which proposes to build an electric railroad to carry freight through Quincy, Mass., connecting with the Old Colony road. The capital stock of the company is $300,000.

Richmond & Danville.—The track on the extension of the Murphy branch of the Western North Carolina Division has been completed to within two miles of Murphy, N. C., where a connection will be made with the Marietta & North Georgia. The end of track last December was at Tomotla, 22 miles from Jarretts, where the branch begins. The work has been delayed greatly by the heavy rains, which have washed away the roadbed on the newer portion of the line, and have also damaged the old road. All the grading is finished, and the work now being done is by forces employed by the company. The country is very mountainous on nearly the entire extension, and especially on the southern part, where 14-degree curves will be necessary. The maximum grades are 4.6 per cent.

On the extension of the North Carolina Midland from Winston, N. C., about eight miles of track has been laid to a point north of Clemmonsville. The grading has been finished through that town and Shady Grove to Mocksville, the terminus of the extension. The branch will be about 23 miles long, and extends in a southwesterly direction from Winston. The entire grading has been completed and the track is being laid by the company. The principal engineering work on the line is the Yadkin River bridge, which will have five spans, 125 ft. long each, from centre to centre. The road is being built with a maximum grade of 4.1 per cent. and maximum curves of eight degrees.

Rio Grande Western.—The engineers are engaged on a preliminary survey for the new line at Soldier Summit, which it is proposed to build to avoid the heavy grade. The route now being surveyed is from Soldier Summit to a point on the main line, about two miles west of Clear Creek, Utah. This line is about 14 miles long, or about eight miles longer than the present route. It will necessitate the construction of a tunnel 1,900 ft. long. The maximum grade will be 105 ft. per mile, and the maximum curves will be eight degrees. The work is not yet far enough advanced to prepare estimates for contractors, and the company will be governed in deciding the time for putting the line under contract and for completing the work by the success in placing the preferred stock recently offered to stockholders.

Rogue River Valley.—This road has been completed this year from Medford, Or., on the Southern Pacific, west to Jacksonville, and has been in operation for the last two months. All the construction work has been finished, with the exception of some ballasting. The line is about five miles long and was built by a lumber company of Portland, which owns extensive tracts of timber at Jacksonville and in southwestern Oregon.

San Francisco Belt.—The contracts for completing the first line of this belt line on the waterfront at San Francisco, Cal., were let this week to Darby & Gaydor for £36,775. The road is owned and operated by the Board of State Harbor Commissioners, and the first section extends from Broadway to Francisco street, connecting with the new Lombard street ferry. The grading of the entire line has been finished and the tracklaying has been commenced, about one-fourth of a mile of track having been laid. Ultimately the belt road will be extended north to Van Ness avenue, and, when the seawall is completed, south to connect with the South Pacific system at Third and Townsend streets. Marsden Manson is the Chief Engineer.

Seaboard & Roanoke.—Six and a half miles of road from Pendleton, Northampton county, N. C., a point on the Roanoke & Tar River branch, west to Murfeesboro, is nearly completed. The road will be open by June 1, and will be operated as a part of the Seaboard Air Line sytem.

Seattle, Lake Shore & Eastern.—Engineer L. H. Carver has made three preliminary surveys for the coal branch to the Blue Canyon coal mines, near Lake Whatcom, Wash. The first line is 4½ miles long, with grade of four per cent., which was impracticable. The second line is from a point north of Ray station and is six miles long, with a grade of 1½ per cent. A third preliminary has been completed, runs from a point a mile south of Ray, giving a low grade and a line 5½ miles long. Mr. Carver favors a switchback from Ray to the pass, five miles long and not more difficult of construction than the others.

Silver Springs Ocala & Gulf.—The grading has been completed for some distance on the southern extension of this line from near Homosassa to Brooksville, Fla. The distance between these points is 35 miles, and surveys have been made for a further extension along the coast of the Gulf of Mexico for about a similar distance to the Anclote River.

Southampton, Tara & Chaltsworth.—This company is applying to the Dominion Parliament for a charter to construct a road from Chatsworth in Grey County, on the Canadian Pacific through the village of Tara to Southampton, Bruce County, on Lake Huron.

Sumpter Valley.—The grading will be resumed in a few days on this road, which is being built from Baker City Or., on the Union Pacific, through Sumpter Valley, for about 25 miles. The grading on the line was begun last July and was continued through the year, until the weather became too cold for the contractors to do any further work. The track was laid on about 15 miles, and the grading was completed for a few miles more. The road extends from Baker City up the south fork of the Powder River and then along the cañon of Powder River, running for about 10 miles through the Blue Mountains. The country through which the route lies is covered with dense woods containing pine, spruce and fir trees. A considerable traffic is also expected from the mines and in cattle. The road is being built by the Oregon Lumber Co., which has mills at Baker City.

Ulster & Delaware.—The Delaware & Otsego, which has completed its track between Hobart and Bloomville, N. Y., will be operated by this company hereafter. The contract completing the arrangement was made this month. The road is about eight miles long, built along the Delaware River, through South Kortright to Bloomville. The surveys have been made for an extension to West Davenport, 12 miles, to connect with the Cooperstown & Charlotte Valley, which extends to Cooperstown, and part of this distance has been graded, but probably the track will not be laid until next year. When the line was built by the Delaware & Otsego it was as an extension of the Ulster & Delaware, an independent organization being maintained to overcome legal difficulties. Unexpected obstructions delayed the construction of the line to Bloomville, and caused the work beyond that town to be abandoned.

Unadilla Valley.—The directors have voted to issue first-mortgage bonds to the amount of $250,000 to complete the road through the Unadilla Valley, from near Utica, N. Y.

Union Pacific.—The company is said to have promised the owners of the mines at Proche, Nev., and on the Milford extension that tracklaying will be resumed in May. The road has been graded for 140 miles from Milford, Utah, to Nevada and the roadbed prepared for the track for nearly the entire distance. Only eight miles of rails had been laid when work was suspended last December, when the present managers were elected.

Westminister & Vancouver.—For a month past engineers have been surveying this short line, and the company has begun clearing the right of way. H. Hoy, the president, says that the line will be built this year. It will be a short cut to Vancouver from Westminister, B. C., of only 12 miles.

Wheeling & Lake Erie.—The company will soon commence grading on the double tracking of its road at Toledo, O. It is stated that the company will lay the second track this year to Norwalk, a distance of 61 miles from Toledo.

Winnipeg & Hudsons Bay.—The Provincial government of Manitoba has included in its estimates for the present year a bonus of $75,000 to this company to complete the first 40 miles of this road already graded from Winnipeg, for which $250,000 has already been advanced. The company has made a proposal to the government through its president, Hugh Sutherland, to complete the entire line within five years if a cash subsidy of $1,500,000 is granted. The government is reported to be disposed to accept this arrangement.

GENERAL RAILROAD NEWS.

Baltimore & Eastern Shore.—The Scranton Steel Co. filed a petition in the United States Circuit Court in Baltimore on April 11 for a receiver for the road. The company alleges that the railroad is indebted to it to the amount of $82,247 for 2,750 tons of rails delivered in October and November, 1890. Joseph Wilmer and Charles E. Kimball have been appointed temporary receivers.

Baltimore & Ohio.—The following statement of the operations of the road for March and the six months has been published: Earnings and expenses for March, 1891, compared with March, 1890: Summary of entire system east and west of the Ohio River: earnings, 1890, $1,992,207; 1891, $1,823,066; decrease, $169,141. Operating expenses, 1890, $1,483,435; 1891, $1,305,919; decrease, $177,516. Net earnings, 1890, $508,772; 1891, $517,147; increase, $8,375. Earnings and expenses for the six months of the fiscal year 1890-91, compared with the same months of the last fiscal year: Summary of the entire system: Gross earnings, 1890, $11,980,604; 1891, $11,698,215; decrease, $282,389. Operating expenses, 1890, $8,254,578; 1891, $8,327,903; increase, $73,325. Net earnings, 1890, $3,726,026; 1891, $3,370,312; decrease, $355,714.

Canadian Pacific.—The company announces the issue of $21,000,000 of four per cent. 50-year gold bonds under its absolute guarantee, but forming a first mortgage on the Minneapolis, St. Paul & Sault Ste. Marie road. Of the whole amount $14,200,000 will be reserved for exchange of existing bonds. Cash subscriptions will be received for the balance at 90 per cent.

Cooperstown & Charlotte Valley.—The agreement of consolidation between the Cooperstown & Charlotte Valley Railroad and the West Davenport Railroad, with the capital stock fixed at $45,000, has been filed with the Secretary of State at Albany, N. Y.

East Line & Red River.—H. C. Cross and G. A. Eddy, Receivers of this line by appointment of the United States Circuit Court, have surrendered control of the property by consent of the Court and transferred the road to W. Giles, who was appointed Receiver last year by the District Court of Travis County, Tex., but was not recognized by the Federal Court. The questions of authority of the two courts in the matter, and of the validity of the appointments of Receivers has been argued for some months, and the Governor of Texas declared the charter of the company annulled and void if the United States Receivers refused to transfer the control of the road to the Receiver appointed by the State Court. The line is a branch of the Missouri, Kansas & Texas, and when that company applied to the State Legislature for a new charter it was asked to agree to transfer this branch to the State Receivers. The railroad company, the United States Courts and all the parties to the litigation have agreed to this action.

Illinois Central.—The income from traffic for the nine months ending March 31 has been as follows:

	1891.	1890.	Inc. or dec.
Miles operated	2,875	2,875	
Gross earnings	$13,610,562	$12,783,892	I. $826,670
Oper. expenses & taxes	9,412,793	8,200,669	I. 1,212,121
Net earnings	$4,197,769	$4,583,223	D. $385,455

Louisville, New Albany & Chicago.—The terms of the sale of the bonds held in the treasury are 70 for the $2,800,000 five per cent. bonds, with a bonus of 50 per cent. in stock. The members of the purchasing syndicate agree to hold the securities for one year and to allow Messrs. Poor & Greenough, of New York, to have an option on them during that time at 80 for the bonds and 20 for the stock.

New York Central & Hudson River.—The gross earnings of the company and its leased lines for March, 1891, were $3,247,328, and for March, 1890, $2,946,522, an increase of $300,806 for the three to March 31. The gross earnings were $8,988,176, against $8,573,780, an increase of $414,395. For the last nine months the earnings were $27,514,866, against $27,850,234, a decrease of $335,368. The earnings for 1891 include $185,889, earnings of the Rome, Watertown & Ogdensburg since March 15.

Pittsburgh Cincinnati, Chicago & St. Louis.—The annual meeting of the stockholders of the company was held in Pittsburgh, April 14. The report of the directors for the year ending Dec. 31, 1890, gives the following figures: Gross earnings, $15,452,932; operating expenses, $11,465,488; net earnings, $3,987,444. The tonnage transported was 13,172,938 tons, an increase, as compared with 1889, of 757,814 tons. There was an increase in freight earnings of $1,175,958, and an increase of 411,787 in the number of passengers carried, as compared with 1889, and an increase of $290,560 in the revenue received therefrom. The report covers 1,578 miles of road.

Poughkeepsie Bridge Co.—The committee of Poughkeepsie Bridge bondholders have determined to proceed with the plan previously suggested, and to which holders of $3,000,000 of the $5,000,000 bonds have already assented. The plan involves the issue of scrip bearing five per cent. interest in exchange for the coupons falling due Feb. 1, 1891, and for two years thereafter, said coupons to be held in trust by the committee.

St. Louis & San Francisco.—The committee of the first-preferred stockholders states that the proposition made by the Atchison, Topeka & Santa Fe to exchange the new four per cent. bonds of the St. Louis & San Francisco for its first-preferred stock, par for par, as explained last week, was rejected by the committee when offered for its acceptance.

Southern Pacific Co.—A brief report of the operations has just been published. The gross earnings for the year were $48,352,503, an increase of $1,884,540; operating expenses, $31,155,202, an increase of $748,675. Taxes and other fixed charges increased the total charges to $15,333,543, so that the balance remaining after the payment of all charges under the leases is $2,377,713.

TRAFFIC.

Chicago Traffic Matters.

CHICAGO, April 15, 1891.

The Board of Commissioners of the Western Traffic Association held another meeting last week, and completed the preparation of their report to the Advisory Board upon the various subjects which had been referred to them. Although the Commissioners declined to make known the result of their deliberations, it is pretty certain that, in addition to the consideration of the subjects especially referred to them by the Advisory Board, they have also prepared a report upon the matter of the sugar rate cutting by the Missouri Pacific, in which they found the Missouri Pacific guilty of a violation of the agreement, and turn that road over to the Advisory Board for discipline.

There has been considerable friction the past week between the Chicago & Alton and the other Chicago lines in regard to the position taken by the former in regard to applying Chicago rates from Milwaukee to Texas points. As Milwaukee lines reach Texas through Kansas City, they claimed that Chicago rates to Texas points should apply through Chicago. This arrangement was made and was assented to by all lines. A dispute arose concerning the divisions of the rate via Chicago, however, the Alton claiming an agreement for a larger division than the Chicago, Milwaukee & St. Paul was willing to concede. Thereupon the Alton announced a reduction of the tariff from Chicago to Texas points. The other Chicago lines did not meet the reduction, and the lines running southwest from St. Louis refused to become a party to through rates on any other basis than the old tariff, claiming that to be the only legal tariff, and asserting that the Alton could not make a reduction to points beyond its own line without their consent. The effect of such a reduction, if met by other lines, would be most disastrous to the Texas lines, as it would reduce Texas rates from all eastern points. The Texas lines insist the Alton has no right to make a fight over divisions by reducing rates in a way sure to prove a general calamity. It has finally been agreed to adjust the matter by arbitration.

The Western Passenger Association has deferred final action on the subject of withdrawing unlimited tickets until the next monthly meeting.

The Burlington has conformed to the request of the Board of Rulings, and will not pay commissions in Trunk line territory. The officers state that they are not committed to the advocacy of any policy for or against commissions, but have agreed, on certain conditions and promises being made by the eastern lines, no longer to stand in the way of the carrying out of the policy. The Alton still insists that it will not change its position, which involves the assertion of the right to corrupt the ticket agents of eastern lines against the expressed wish of their employers. The eastern lines have notified the Alton, that unless it will do their joint business on terms acceptable to them they will not transact joint business with it at all. This the Alton calls a "boycott," and the situation of the fight of 1887 over the commission question is renewed, with this difference that the eastern lines simply "turned the Alton tickets to the wall," while now in addition to this they refuse to receive tickets and baggage checks of the Alton issue, or reading over the Alton road. The Alton has always claimed that it made money by the other contest, but it is hard to see how this was true as it unquestionably lost much business while the fight was in progress, and incurred great expense in establishing agencies at the east, in order to put its tickets on sale in eastern cities. Possibly it succeeded in getting the good will of the local ticket agents of eastern lines, from which it received benefits after the war was over; but if so, it was at the expense of that entire impartiality and freedom from discrimination which the eastern lines owe to all their western connections. It is hard to see how a partnership in passenger transportation can be forced upon parties who simply insist that their own agents shall be let alone, and the Interstate Commerce Commission on the former occasion held that the eastern lines were right.

The Illinois Traffic Association, whose object has been to protect rates in Illinois, has been disbanded, on the ground that the traffic covered by the association is fully covered by the agreements of the Western Traffic and Western Freight associations.

It is reported that the Kanawha Despatch Line has filed a tariff with the Interstate Commerce Commission cutting the rates on export lard and provisions from Chicago to Newport News from 27 to 22 cents per 100 lbs., and on export flour and grain from 22 to 17 cents. This would give that line an advantage of 8 cents per 100 lbs. over the Chicago-New York rates.

The Joint Committee have authorized a rate of 30 cents per 100 L. C. L., and 25 cents C. L., between New York and Chicago, both east and west bound on iron and steel articles.

Some trouble has been experienced, as usual, in putting in effect the lake and rail rates to St. Paul. The Great Northern claiming that the St. Paul jobbers were discriminated against by the Chicago lines, and demanding that they be better protected by the advance in rates from Chicago to points in the northwest before the Great Northern would agree to the lake and rail basis. They have finally agreed to leave the matter to the Commissioners of the Western Traffic Association for arbitration.

The litigation growing out of the boycott of the American Live Stock Commission Co., by the Omaha Stock Yards, has been settled by the filing of articles, in which the former agree to pay no more rebates, in return for having the usual rights accorded its agents at the yards. This virtually disposes of the trouble, including the $250,000 damage suit instituted against the Kansas City Stock Yards by the American Co. for discrimination.

Traffic Notes.

The Charleston (S. C.) car service association has lengthened the free time allowance on bulk freight from 48 to 72 hours.

The coal mines at Patton, Ala., have lately made a shipment of 6,000 tons of coal westward over the Georgia Pacific, 237 miles to Greenville, Miss., whence it will be carried in barges down the Mississippi to New Orleans.

The anthracite coal trade is awaiting with anxiety the outcome of the Interstate Commerce Commission decision in the Coxe Bros. & Co. vs. Lehigh Valley case. The uncertainty as to what action the road will take has paralyzed the coal shipping business.—*Philadelphia Public Ledger.*

The Pike's Peak railroad will commence operations for the summer on June 10. The rate for the round trip from Manitou is fixed at $5, which will be collected from every man, woman and child who ascends. There is a competing line in the form of the carriage company which operated from Cascade last year. This concern does not propose to retire defeated by any means, but will start from Manitou this year instead of Cascade. Meanwhile the lowly burro is still in the ring, and will continue to do business at cut rates.—*Rocky Mountain News.*

The Interstate Commerce Commission has decided the case of the Delaware State Grange of the Patrons of Industry against the New York, Philadelphia & Norfolk, the Delaware, the Philadelphia, Wilmington & Baltimore, and the Pennsylvania roads in favor of the complainants. The points decided are briefly as follows: For a special service, such as perishable freight, a higher than ordinary rate is warranted, but it should bear a just relation to the value of the service, and is not wholly in the discretion of the carrier. Certain rates on perishable articles of truck farming to Jersey City and Philadelphia are ordered reduced.

Navigation on the lakes will probably open next week, but freight rates between New York and Duluth have not yet been announced. There was a conference between the rail and the lake lines, at which it was agreed that the lake and rail rates from New York to St. Paul, via. Duluth, should be $1.01 first class, which is 10 cents lower than the rate by lake to Chicago and thence by rail. The Great Northern, however, has not yet formally agreed to the decisions of the conference. It is said that the road has promised to submit the question of a differential, which it desires shall be larger, to arbitration.

Western Traffic Association.

The second quarterly meeting of the Advisory Board of the Western Traffic Association convened at Chicago April 14. All the important lines were represented except the Missouri Pacific, Great Northern, Union Pacific and Southern Pacific. There being one less than a quorum present, the meeting adjourned until Wednesday, when there was still no quorum. The meeting then adjourned after adopting the following resolutions:

"WHEREAS, The regular meeting of the Advisory Board after two days' session, finds itself unable to proceed with business from the want of a quorum by reason of the absence of the representatives of the Great Northern, the Missouri Pacific, the Union Pacific and the Southern Pacific Railroads, and,

"WHEREAS, There are many important matters demanding the immediate attention and action of the board, which have been presented by the Commissioners, including proposed amendments to the by-laws, the relation of this association to lines not members, and to the existing freight and passenger associations, the subject of joint agencies, of passenger commissions, also the report of the Commissioners on the subject of violation of the agreement by the Missouri Pacific Railroad, and an appeal taken by members from a decision of the Commissioners; and

"WHEREAS, Some of these matters are of such importance that if not acted upon at an early date the integrity and life of this Association are threatened; therefore,

"*Resolved*, That the chairman be requested to immediately ascertain the earliest date at which a quorum can be secured, and that this meeting be adjourned subject to the call of the chair as to time and place."

The Board of Commissioners submitted a report covering the result of their investigation in regard to the cutting of sugar rates by the Missouri Pacific, and it is understood that they found that road guilty of a violation of the agreement in so doing. The agreement and the by-laws contain separate provisions for action under such charges. The agreement provides that if any officer of any member shall authorize any variation from established tariffs he shall be discharged. The by-laws provide that all violations of the agreement shall be reported to the advisory board by the commissioners for such action as it may deem expedient.

The Board of Commissioners also presented an exhaustive report concerning the continuance of the auxiliary associations. It was understood when the Western Traffic Association was formed that the other associations would be merged into the Western Traffic, as soon as the members in these various associations became members of the Western Traffic, and the Commissioners prepared a report assigning the territory of the new association so as to take in these auxiliary bodies. As these lines have not as yet joined the Western Traffic Association, and as there are lines in the Western Traffic which are not members of the other associations, it has been a difficult matter for the Commissioners to harmonize the various conflicting interests and continue all the associations.

A disposition was manifest to have carefully considered all subjects presented to the meeting, and considerable disappointment was evinced at the failure to secure a quorum. The adjourned meeting will be convened at an early date.

The Ticket Commission Boycott.

The Chicago & Alton threatens to proceed against the Eastern lines in the courts on a charge of conspiracy, in agreeing to discontinue joint ticket arrangements. Below is a statement of some of the reasons for the action of the Trunk Line Board of Rulings; other phases of the matter are discussed in our Chicago traffic letter and in the editorial column:

"Our companies discontinued such payments of commissions in Western territory without waiting to be assured in what manner Western lines would divide the eastwardly passenger business, and we ask the Western lines to discontinue the same payments in our territory without antecedent conditions. The traffic may thereafter follow their various lines in proper proportions. If it should prove otherwise, the board has the power to order diversions and equalizations, for which purpose the immigrant traffic is especially available. It is also desirable that before we endeavor to divide the west-bound business the Western roads should form some agreement or advise us of the proportions in which it should be apportioned. If the compliance of most of the Western lines be secured, the board would feel called upon to exercise its right for the prompt protection of the assenting lines which observed our requests. The board does not regard it incumbent upon it or consistent with the duties or information in its possession to give more specific assurances at this time than foregoing. We feel that we are now entitled to some definite assurances from the Western roads upon the general question before we should further declare our own. The board is further organized to hear and redress harmful results, and will do so in a broad and fair spirit if they can be so met by Western lines."

East-Bound Shipments.

The shipments of east-bound freight from Chicago by all the lines for the week ending Saturday, April 11, amounted to 62,464 tons, against 76,654 tons during the preceding week, a decrease of 14,190 tons. The proportions carried by each road were:

	Wk. to April 11		Wk. to Apr. 4.	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	8,900	6.9	10,286	13.4
Wabash	4,284	14.3	4,652	6.1
Lake Shore & Michigan South.	8,074	12.9	8,409	11.0
Pitts., Ft. Wayne & Chicago	5,757	9.2	5,995	7.8
Chicago, St. Louis & Pitts.	6,671	10.5	9,034	11.8
Baltimore & Ohio	3,833	6.2	3,7.6	4.8
Chicago & Grand Trunk	10,381	16.6	13,252	17.3
New York, Chic. & St. Louis	7,538	12.1	12,256	16.0
Chicago & Atlantic	7,026	11.3	9,944	11.0
Total	62,464	100.0	76,654	100.0

Of the above shipments 4,063 tons were flour, 28,970 tons grain, 4,727 tons cured meats, 1,871 tons lard, 6,702 tons dressed beef, 1,045 tons butter, 951 tons hides, 52 tons wool and 7,158 tons lumber. The three Vanderbilt lines together carried 31.9 per cent., while the two Pennsylvania lines carried but 19.7 per cent.